RIPE NCC

LIR Handbook

January 2012 / RIPE NETWORK COORDINATION CENTRE

Most Important Definitions at a Glance

I just want some IP addresses. What should I do?.....p5

IPv4 Address Space Exhaustion.....***Preface***.....p12
What is an LIR ?.....***Section 1.2***.....p15
Allocation .....***Section 3.2***.....p43
Assignment .....***Section 3.2*** and ***4***.....p43,p47
Assignment Window .....***Section 7***.....p75
Sub-allocation .....***Section 8***.....p89
Valid Assignments .....***Section 6.6***.....p71
Valid RIPE Database objects .....***Section 6.6*** and ***6.7***.....p71,p72
Communication Process for Assignments .....***Section 4***.....p47
CIDR .....***Appendix F***
What "netname:" should I use for my assignment ?.....***Section 4.3.2*** and ***6.1***..p52,p67
Differences between RIPE DB Syntax and RIPE Policy .....***Section 6.7***.....p73
LIR's own infrastructure .....***Section 7.7***.....p84
Verification requirements for Broadband assignments.....***Section 5.1***.....p59
Difference between PA and PI addresses .....***Section 13***.....p129
IP management tools .....***Section 6.2***.....p68
Protecting your objects in the RIPE Database, mntners..... ***Section 2.4.3*** and***10.2***. p36,p101
mnt-lower,mnt-routes .....***Section 10.3***.....p108-p113
mnt-domains, reverse delegation:.....***Section 11***.....p114
Person and role objects, nic-hdl .....***Section 2.4***.....p31-p34
tech-c, admin-c .....***Section 6.1***.....p64
LIR contact persons .....***Section 3.1***.....p39-p40
"Reg" file:.....***Section 3.1***.....p42
Difference between LIR contacts and tech-c, admin-c .....***Section 6.1***.....p66
Difference between LIR contacts and LIR Portal user accounts ....***Section 9.2***.....p93
How many IPs can I assign to an End User today without asking?.***Section 7.4***.....p78
organisation object.....***Section 10.9***.....p111
Test RIPE Test Database.....***Section 10.7***..... p111
32 BIT ASN.....***Section 14.4***.....p135
GLOSSARY.....***Appendix 5***..... p165

- Some definitions that you can find easily in the "***Table of Contents***" on page 5 are not listed here. (e.g. the difference between RIPE and the RIPE NCC is obviously found in ***Section 1 - RIPE and RIPE NCC***)

- For a graphical overview of the relationship between RIPE Database objects see **Appendix H**

This book can be found online at: ***www.ripe.net/training/lir***

I am an LIR, but I am not familiar with all these RIPE Policies and Procedures…
I just want some IP addresses. What should I do?…"

Optional, but advisable:

Get an LIR Portal account.

See ***Section 9 - LIR Portal*** in this book

Come to a free "LIR Training Course"

www.ripe.net/training/lir

1. Get your first allocation if you do not have one already.

*See **Section 3** in this book.*

*See **Section 3.2** for definitions of 'allocation' and 'assignment'*

2. Make PA assignment(s) for the IP addresses needed.

(Check for each assignment whether or not you have to request it from the RIPE NCC)

Register each assignment in the RIPE Database.

*See **Fig 4.1*** and
Sections 4, 5, 6 *in this book.*

Your Assignment Window (AW) is probably 0. In this case you have to request approval from the RIPE NCC for every assignment.

You can find out the size of your AW via the LIR Portal.

If your AW > 0 then:

Distinguish whether the assignment is
- *above your AW*
- *or below your AW*

- *for an End User (customer)*
- *or for your own (LIR's) infrastructure*

Based on the above decide whether or not you have to send a "PA Assignment Request Form".

*To help you decide read **Section 7- AW***

Optional, but advisable:

3. Set up Reverse Delegation for your allocation if you have not done so already.

See ***Section 11 - Reverse Delegation***

Optional:

Request an AS number if you need one.

Create a route object for your allocation.

See ***Section 14 - Autonomous System Numbers and the Routing Registry***

Table of Contents (JANUARY 2012)

TABLE OF CONTENTS (JANUARY 2012) 7
PREFACE 11
0.1 Course Background 11
0.2 Course Objectives 11
0.3 Material Structure 11
0.4 IPV4 Address Space Exhaustion 12
1. RIPE AND THE RIPE NCC 13
1.1 Introduction to RIPE 13
1.2 Introduction to the RIPE NCC 15
1.3 The Policy Development Process in the RIPE Region 19
1.4 The Policy Implementation Process 21
1.5 Summary 22
2. RIPE DATABASE BASICS 23
2.1 RIPE Database Introduction 23
2.2 RIPE Database Objects 23
2.3 Querying the RIPE Database 24
2.3.1 RIPE Database web interface 24
2.3.2 Whois web interface 26
2.3.3 "Glimpse" search 27
2.3.4 Email addresses in objects hidden in whois query results 27
2.4 Creating Objects in the RIPE Database 28
2.4.1 Creating person objects using the "Startup Tool" 28
2.4.2 Creating person objects using "Webupdates" 33
2.4.3 The mntner object 36
2.4.4 Creating objects using the email interface 37
2.4.5. Creating objects using the Syncupdates 38
3. HOW TO SET UP AN LIR. FIRST ALLOCATION 41
3.1 How to Set up an LIR 41
3.2 Terminology 43
3.3 First Allocation Request and First Assignment Request(s) 44
4. REQUESTING (PA) ADDRESS SPACE 47
4.1 Overview 47
4.2 Steps of the Assignment Process 47
4.2 Communication with IP Resource Analysts 50
4.3 Completing the Request Form 52
4.3.1 Gathering Information 52
4.3.2 The Request Form 52

4.4 Conclusion **57**
5. EVALUATION OF ADDRESS SPACE REQUESTS 59
5.1 Evaluation **59**
5.2 Points to Consider for Your Internal Administration **63**
6. REGISTERING ADDRESS SPACE IN THE RIPE DATABASE 65
6.1 Creating Network (inetnum) Objects **65**
6.2 How to Manage the LIR's Allocated Address Space **68**
6.3 Registering an Assignment via the Database E-mail Interface **70**
6.4 Registering an Assignment via "Webupdates" **70**
6.5 More information **71**
6.6 Valid and Invalid Assignments **71**
6.7 RIPE Database Syntax vs RIPE Address Policy **72**
6.8 Assignments to (Small) ISPs **72**
7. ASSIGNMENT WINDOW (AW) 75
7.1 Assignment Window Policy **75**
7.2 How to request an AW raise? **77**
7.3 When is an AW size lowered? **77**
7.4 Assignment Process to End Users **78**
7.5 Responsibilities of LIRs within their AW **78**
7.6 An Example of Using the LIR's AW When Making Assignments to an End User **81**
7.7 AW for LIR's Own Infrastructure **84**
8. SUB-ALLOCATIONS 89
8.2 Making Sub-allocations **89**
8.2 Making Assignments from Sub-allocations **90**
9. LIR PORTAL 93
9.1 How to Activate your Account **93**
9.2 User Accounts: Viewing the Resources **93**
9.3 Scope of the LIR Portal **94**
9.4 X.509 PKI: Improved Secure Communication System for RIPE NCC Members **97**
9.5 Feedback and Improvement **98**
10. ADVANCED DATABASE ISSUES 99
10.1 Flags – Advanced Queries **99**
10.2 Protecting Database Objects **101**
10.3 Hierarchical Authorisation (mnt-lower, mnt-routes) **104**
10.4 Mnt-by, mnt-lower, mnt-routes Attributes in Comparison **105**
10.4.1 The difference between the mnt-lower attribute and the mnt-by attribute. **105**
10.4.2 The mnt-routes attribute **109**
10.5 IRT Database Object **110**

10.6 Updating Database Objects **110**
10.7 Replacing Assignment inetnum Objects **111**
10.8 RIPE Test Database **111**
10.9 Organisation Object **112**
11. REVERSE DELEGATION 117
11.1 Overview **117**
11.2 Reverse Address Mapping **117**
11.3 Setting Up Reverse Delegation **118**
11.4 /24 Reverse Zone Setup **119**
11.5 Setting Up the Delegation : Creating the Domain Object. **119**
11.6 Range Sizes That Can Be Set Up for Reverse Delegation **120**
11.7 Problems with the Setup? **120**
11.8 Reverse Delegation of a /16 Allocation **121**
11.9 Changing / Deleting a Delegation **121**
11.10 Common Errors when Setting Up Reverse Delegation. **121**
11.11 Reverse Delegation for Assignments < /24 ..... **121**
12. DIRECT RESOURCES 127
12.1 End User requesting resources 'indirectly' via a sponsoring LIR **127**
12.2 End User requesting resources 'directly' from the RIPE NCC **127**
13. PI ADDRESS SPACE 129
14. AUTONOMOUS SYSTEM NUMBERS AND THE ROUTING REGISTRY 135
14.1 Overview **135**
14.2 Definitions **135**
14.3 How to Get an AS Number **135**
14.4 32 Bit AS Numbers **137**
14.5 Internet Routing Registry (IRR) **137**
14.6 The Route Object **138**
14.7 RPSL **138**
14.8 RPS Security **139**
14.9 Tools **140**
15. ADDITIONAL ALLOCATION 143
16. INTRODUCTION TO IPV6 147
16.1 Overview **147**
16.2 IPv6 Initial Allocation Policies **147**
16.3 IPv6 Assignments **147**
16.4 IPv6 Subsequent Allocations **148**
16.5 IPv6 Assignments for IXPs **149**
16.4 IPv6 PI Assignments **149**

17. ADMINISTRATIVE ISSUES 151
17.1 Audit 151
17.2 Billing Procedure 152
17.3 Closing / Merging / Taking-over an LIR 153
18. ADVANCED COURSES 155
18.1 General Information 155
18.2 Routing Registry Training Course 155
18.3 IPv6 for LIRs Training Course 156
19. RIPE NCC E-LEARNING CENTRE 157
APPENDICES: 159
Appendix 1: Contact E-mail Addresses 159
Appendix 2: List of RIPE Documents 160
Appendix 3: Bit Boundaries Chart 163
Appendix 4: List of Acronyms 164
Appendix 5: RIPE NCC Glossary 165
Appendix 6: Object Templates in the RIPE Database 169
Appendix 7: Completed Provider Aggregatable (PA) Assignment Request Form 173
Appendices A-H 175-182

PREFACE

0.1 Course Background

The RIPE NCC provides training courses for its members, Local Internet Registries (LIR). It is important that LIRs keep informed and remain up-to-date on the policies and procedures for IP address allocation and assignment. The course is designed to provide LIRs with the support needed to carry out their business efficiently, with all the issues related to their communication with the RIPE NCC, and the services of the RIPE NCC. Funding for the courses is provided by the membership fee paid by the members. The LIR Training Course is a membership activity of the RIPE NCC.

0.2 Course Objectives

The main objective of the LIR Training Course is to teach the membership of their responsiblilities as LIRs in IP resources administration, so that can interact with the RIPE NCC in requesting Internet resources. The target audience for the LIR Training Course are new LIRs and new staff of established LIRs.

The course does not go into great detail on each topic. It provides a solid overview and suggests pointers to more detailed information. Relevant examples are used in each section.

Course Schedule: 9:30am - 4:30pm.

Secondary objectives include:

- Informing LIRs of policies and procedures and the importance of their involvement in RIPE.
- Liaison with membership - giving the members a chance to meet theRIPE NCC staff.

The course is NOT designed to:

- Attempt to inform LIRs about the goings-on in the Internet.
- Explain the technical aspects of operations.
- Present advanced issues not relevant to a new LIR (or new staff member of an existing LIR).
- Provide fundamentals of general networking strategies, internal networking practices, DNS or Routing.
- Provide an interactive session nor hands on exercises.

0.3 Material Structure

This ***LIR Handbook*** was prepared to accompany the slides used during the LIR Training Course.
The ***LIR Handbook*** has the following structure:

- Most important definitions at a glance
- Graphical Overview: How to Get IP Addresses
- Table of Contents
- Main Body
- References at the end of each section
- Appendices 1-7 and A-G

The most important definitions and explanations are in **grey boxes** throughout the LIR Handbook.

Diagrams are used extensively throughout the LIR Handbook.

More about training courses, including links to all the materials used:
http://www.ripe.net/training/lir/

0.4 IPV4 Address Space Exhaustion

The IANA IPv4 free pool was exhausted on 3 February 2011. Each of the Regional Internet Registries (RIRs) has now received one of the final five /8s. The RIPE NCC has been allocated 185/8.

The RIPE NCC is holding reserves totaling approximately four /8s (around 75 million individual IPv4 addresses), not including 185**/8.**

We will continue to distribute IPv4 addresses from our reserves according to the current policy, ripe-509, "IPv4 Address Allocation and Assignment Policies for the RIPE NCC Service Region".
http://www.ripe.net/ripe/docs/ripe-509

When our reserves are exhausted, we will begin to distribute IPv4 addresses from 185/8 according to section 5.6 of ripe-509.
http://www.ripe.net/ripe/docs/ripe-509#----use-of-last----for-pa-allocations

This policy states that each Local Internet Registry (LIR) will receive one /22 (1024 IPv4 addresses) from 185/8 upon application for IPv4 resources. In order to obtain this /22 allocation, the LIR must already have requested an IPv6 allocation.

For more information about how to deploy IPv6, please see IPv6 Act Now**.**
http://ipv6actnow.org

As we unable to anticipate consumption rates, we cannot fully predict how long our reserves will last. However, we would like to reassure you that our supplies will not be exhausted within the coming months.

Our Registration Services Department has seen an increase in the number of IPv4 requests in the last few days and is working hard to evaluate all requests. We ask for your patience during this busy period.

1. RIPE and the RIPE NCC

Overview

RIPE and the RIPE NCC are two distinct entities, although dependent on each other.
In this section you find some background information about both RIPE and the RIPE NCC. Their structure and activities are outlined, as well as their relation to other organisations.

Learning objectives

- To understand the differences between RIPE and the RIPE NCC
- To recognise both RIPE and the RIPE NCC
- To understand how to take part in the decision making (PDP)

Keywords

Discussion forum, community, membership, Regional Internet Registry, policy development

Contents of this section

- Introduction to RIPE NCC
- Introduction to RIPE NCC
- The policy development process in the RIPE region

1.1 Introduction to RIPE

RIPE stands for Réseaux IP Européens and it is a collaborative forum open to all parties interested in wide area IP networks.

RIPE is an open community that was set up in 1989 to ensure the administrative and technical co-ordination necessary to enable the operation of a pan-European IP network.
No membership is required to be part of the RIPE community. Anyone who has any kind of interest in discussing Internet policies is welcome. Activities are performed on a voluntary basis and decisions are formed by consensus. This means that it is not a majority vote that wins but rather everybody has to agree on the decision. RIPE is not a formal organisation, nor a legal entity. It has no legal power and does not develop Internet standards.

RIPE Working Groups

The RIPE community is an important source of public input for the RIPE NCC. RIPE plays an influential role in setting the annual activities and budget of the RIPE NCC.

Most of the work of **RIPE** is done in **Working Groups** (WG).

The working groups meet twice a year, but mostly, the discussions happen on the mailing lists. Each WG has one or more mailing lists. All of them are open but moderated for spam. If you are interested in participating you can subscribe to the mailing lists at *http://www.ripe.net/mailman/*

RIPE also has a general announcement e-mail list **<ripe-list@ripe.net>.**

Working Groups		
Address Policy	The open forum where RIPE policies are made that affect Internet resources (IPv4, IPv6 and ASN)	***address-policy-wg@ripe.net***
Anti - Abuse	Fights the problem of network abuse	***anti-abuse-wg@ripe.net***
Database	Deals with all issues related to the RIPE Database	***db-wg@ripe.net***
DNS	Domain Name System questions and issues	***dns-wg@ripe.net***
EIX	Issues and problems related to the European Internet Exchange	***eix-wg@ripe.net***
ENUM	Internet resource mapping using E.164 telephone numbers as identifiers	***enum-wg@ripe.net***
IPv6	Following the progress of specification and implementation of IPv6.	***ipv6-wg@ripe.net***
RIPE NCC Services	Discussion about new and existing RIPE NCC services and evaluating the RIPE NCC's yearly Activity Plan.	***ncc-services-wg@ripe.net***
Routing	Issues dealing with routing architecture for the Internet in the RIPE NCC service region.	***routing-wg@ripe.net***
Measurement Analysis and Tools	Forum where the RIPE NCC and the community can collaborate in the areas of data, tools and analysis of the Internet and its infrastructure, with a loose focus on monitoring, diagnosis, analysis and forecasting	***mat-wg@ripe.net***
Cooperation	Forum for discussion focusing on cooperation between the private and public sectors on Internet matters.	***cooperation-wg@ripe.net***

More information about RIPE Working Groups can be found at:
http://www.ripe.net/ripe/wg
All working groups have **mailing lists** where important discussions take place. Subscription to mailing lists is possible at the following webpage:
http://www.ripe.net/mailman/
RIPE also has a general announcement e-mail list ***<ripe-list@ripe.net>.***
The mailing lists are open but moderated for spam. More information about mailing lists and mailing list archives can be found at:
https://www.ripe.net/maillists

RIPE Meetings

The RIPE meetings are held twice a year within the RIPE region and their main purpose is to discuss technical and policy issues affecting Internet administration.
The RIPE meetings are open to the public. In each meeting, discussions are split in to Working Groups. These discussions range from technical matters such as DNS, routing, and database to policy issues affecting Internet administration such as IP assignment and allocation policies. Network operators also meet at RIPE Meetings to discuss technical co-ordination matters. RIPE Meetings provide an opportunity for the community to meet face-to-face and exchange information and experiences relating to IP networking.
No membership is needed, so everybody can attend a RIPE meeting and become part of the community.

Policies regarding IP networking are created within the RIPE collaborative forum. The RIPE NCC does not set policies, but ensures the consistent application of policies within its service region.

There is also a **RIPE NCC Services Centre set** up at RIPE Meetings with RIPE NCC IP Resource Analysts and RIPE NCC employees from other departments available to attendees. You can drop by at any time during the meeting and can also make appointments with the Analysts.

The purpose of the RIPE NCC Services Centre is to make it possible for LIRs to discuss an on-going requests; policies and procedures or any other issues related to the Registration Services activities with an Analyst. Analysts can look at particular requests if necessary.

RIPE Meetings provide participants with a chance to influence Internet administration in the RIPE NCC service region.

What are the benefits of attending a RIPE meeting?

- Decisions are made in an open forum where everyone attending can voice an opinion.
- The RIPE community is extremely influential. If you contribute during a RIPE Meeting your opinion will have an influence on the policies. Your organisation and the Internet industry is directly affected by these policies.
- Excellent opportunity for learning. Many topics are discussed. Therefore you are able to keep up-to-date with new developments within the Internet industry.
- Opportunity to meet potential customers, collaborators or business partners. You can meet with people from all over the world, and share information, ideas and solutions to problems that your organisation may also be facing.
- IP Tutorials: A shortened version of the RIPE NCC LIR Training course is usually given at RIPE Meetings. Attendance is NOT restricted to LIRs. Everyone is welcome.
- **New LIRs** get **two free tickets** to attend a RIPE Meeting during their first year. (The tickets cover the meeting fee. The attendees are responsible for making their travel and accommodation arrangements themselves).

More information about RIPE Meetings is available at: *http://www.ripe.net/ripe/meetings*

1.2 Introduction to the RIPE NCC

What is the RIPE NCC (RIPE Network Coordination Centre)?

The **RIPE NCC** is an independent not-for-profit organisation supporting its members (Local Internet Registries = LIRs) and the RIPE community.

The **RIPE NCC** is one of the 5 Regional Internet Registries in the world.

The core activity of the RIPE NCC is to act as the Regional Internet Registry (RIR) in its service region (Europe, Middle East and Central Asia), providing global Internet resources and related services.
The RIPE NCC requires a membership.
The RIPE NCC provides administrative support to the RIPE community, by organising the RIPE meetings and implementing all the policies that the community decides.
In opposite to the way the RIPE community Works, the RIPE NCC requires an official membership. This **membership** is made up of **Local Internet Registries (LIRs), which** distribute IP addresses in the RIPE region. Membership is open to everyone. This membership requires the payment of a yearly fee.

See section 3.1, for how to become a RIPE NCC member

See ***Section 3.1 - How to Set up an LIR*** for how to become a RIPE NCC member.
We summarise the differences between RIPE and the RIPE NCC in the table that follows:

RIPE NCC	RIPE
Was started in 1992	Started in 1989
Has employees	No employees. People join the RIPE community on a voluntary basis
Produces a yearly budget and an action plan	Doesn't have yearly budget or action plan
Is located in Amsterdam	Doesn't have a physical location. People communicate via mailing lists and meet twice a year at the RIPE meetings
Implements policies and decisions made by the community	Develops policies and decides how the Internet resources (Ipv4, IPv6 and ASN) will be distributed
Is a not-for-profit organisation	Is an open discussion forum
Provides services for members and non-members. Its members are called LIR's	Doesn't have official membership
It is a legal entity	It is not a legal entity

RIPE NCC Services
What can I get out of the RIPE NCC?

The **RIPE NCC** provides **Member Services** (for LIRs) and **Public Services** (for the public at large).

The core services of the RIPE NCC include the distribution and registration of:

- Internet (IP) address space,
- Interdomain routing identifiers (BGP Autonomous System Numbers, ASNs),
- The management of reverse DNS (in-addr.arpa and ip6.arpa),
- Maintenance of RIPE Database.

The activities of the RIPE NCC fall under member and public services and include the following:

Member Services	Registration services	IPv4 and IPv6 allocations and assignments
		AS numbers
		Second opinions on assignments and provides support and guidance to the LIRs.
		Contact e-mail address: ***hostmaster@ripe.net***
	Training services	LIR training course
		Routing Registry training course
		DNS for LIR's training course
	Reverse Domain Name Delegation	The RIPE NCC does **not** register domain names. For information about registering domain names in the RIPE NCC service region, under ccTLDs, see Council of European National Top-level domain Registries (CENTR): *http://www.centr.org/* Contact e-mail address for questions and assistance: ***ripe-dbm@ripe.net***

Public Services	Co-ordination Services	RIPE support
		RIPE Database maintainance
		Routing registry maintainance
		Liaison/support for the RIPE community
		Co-ordination with partner organisations such as: RIRs / ICANN / IANA /IETF/ISOC etc.
		Information dissemination
	Projects	Routing registry Consistency Check (RRCC)
		Deployment of Internet Security Infrastructures (DISI) e.g. DNSSEC
		Test Traffic Measurements (TTM)
	Other	Routing Information Service (RIS)
		Test TrafficK-root nameserver
		ENUM (e164.arpa domain)

Regional Registry Structure

As we mentioned before, the RIPE Network Coordination Centre (**RIPE NCC**) is one of 5 **Regional Internet Registries (RIRs)**, providing allocation and registration services to support the operation of the Internet globally.

The other RIRs are:

APNIC – in the Asia Pacific Region
ARIN – in North America (excluding Mexico).
LACNIC – in Latin America and in the Caribbean Region
AfriNIC – in Africa.

The five RIRs receive address space from the IANA (Internet Assigned Numbers Authority) and in turn allocate the addresses to the LIRs.

Below, you can find a world map showing the in to the RIR regions.

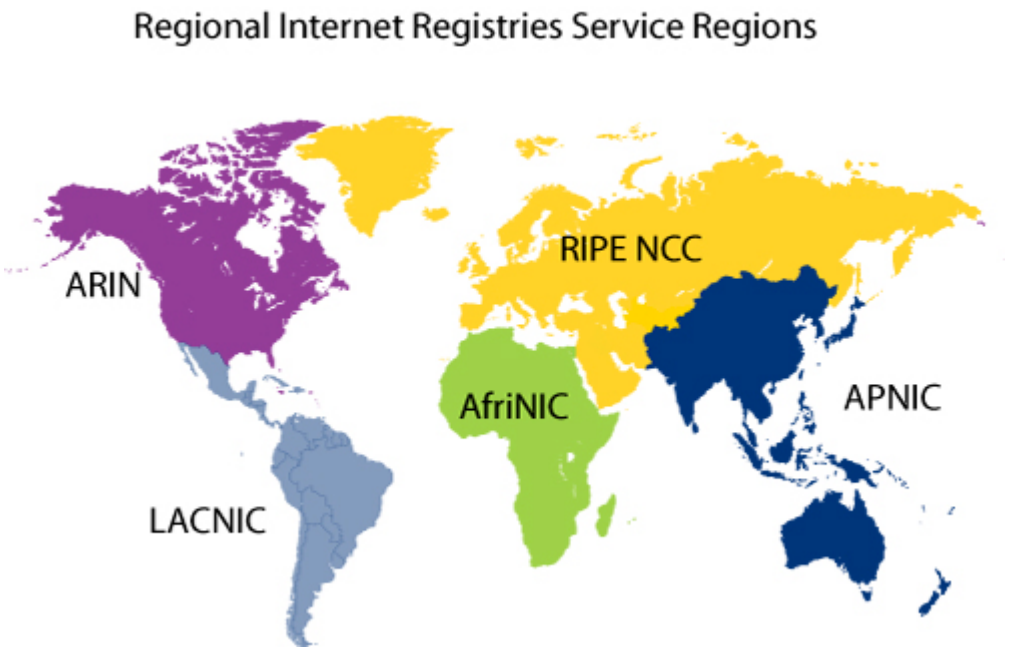


***Fig. 1-1** The RIR Service Regions*

RIPE NCC in the Global Context

You can find the Global RIR organisational structure at:

http://www.ripe.net/info/resource-admin/structure.html

The IANA is a function of the **ICANN (Internet Corporation for Assigned Names and Numbers).** The ICANN is a non-profit corporation that was formed to assume responsibility for the IP address space allocation, protocol parameter assignment, domain name system management, and root server system management functions performed under U.S. Government contract by IANA and other entities.

ICANN has various supporting organisations, each having a specific area of expertise. The Address Support Organisation (ASO) is one of them.

The RIRs are members of the ASO. The ASO's task is to make IP address policy recommendations to ICANN. IP Address policies are developed using a bottom-up structure and the existing open processes that exist in the RIRs. In the RIPE NCC service region this is done in the Address Policy Working Group of RIPE.

1.3 The Policy Development Process in the RIPE Region

Principles

- Everyone is welcome and encouraged to take part in the workings of RIPE by attending RIPE meetings and participating on RIPE Working Groups mailing lists:
- Mailing lists are publicly archived;
- The minutes of Working Group sessions at RIPE meetings are publicly archived;
- All policies are formally documented and publicly available.

For more information about the Policy Development Process see: http://ripe.net/ripe/docs/pdp.html

Why do we need policies?

Internet numbers (IPv4 and IPv6 addresses AS numbers, etc) are a limited resource. To ensure their fair distribution suitable policies are needed.
Policies are also meant to keep the growth of the global routing table within limits and establish how contact information for troubleshooting is made publicly available (RIPE Database).

What is the policy development process like?

Open Anyone can participate. All happens in a public forum, no membership or fees required.
Clear Formally documented-long established process. All discussions and results publicly archived.
Concensused-based decision making Decisions are made within specialised Working Groups (WG). The working groups and their e-mail addresses are listed at the beginning of this chapter.
Bottom-Up Decisions are taken by the different regional communities (by RIPE in the RIPE region). Global policy is coordinated by the Regional Internet Registries (eg the RIPE NCC) based on the policies developed in their region.

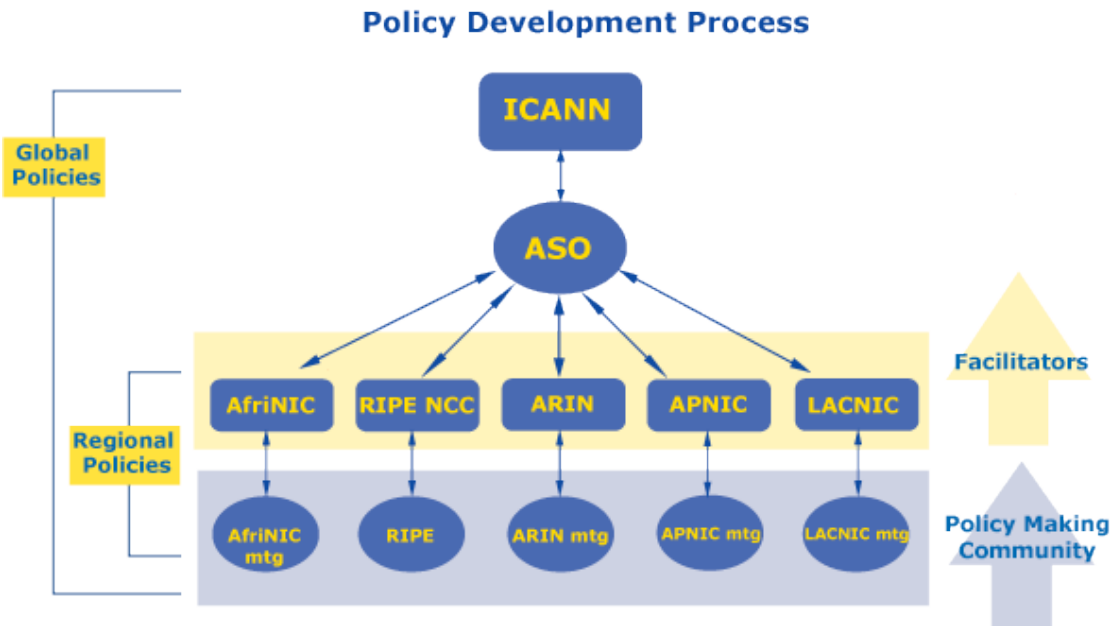


***Fig. 1-2** Regional and Global Policy Development Process*

Which policies can be influenced?

Broadly speaking, we can categorise policies under three headings. Below you can see what policies can be influenced in which RIPE Working Groups.

Internet number resources distribution :
- address-policy-wg

RIPE database operations:
- db-wg

Operational recommendations
- routing-wg
- dns-wg
- anti-spam-wg
- ipv6-wg

Phases in the Policy Development Process

1. Proposal phase	If you would like a change, make your own policy proposal and send it to..... To propose a new policy you don't need 0to be a member of the RIPE NCC. Anyone can participate.
2. Discussion phase	The discussion about the proposal takes place in the appropriate Working Group mailing list. A draft document is prepared by the proposer and it is published on the RIPE NCC website and announced o the Working Group mailing list for review.
3. Review phase	The draft document is reviewed. Comments on the draft are solicited, collected and incorporated into a revised draft.
4. Concluding phase	Working Group chair seeks consensus.

How can I participate?

You can take part in the ongoing discussions.

-Follow the ongoing policy discussions.
-Subscribe to the discussions mailing lists (WG mailing lists)
-Come to the RIPE Meetings
-You can also follow the RIPE Meetings remotely : webcast (on the RIPE website), IRC or "jabber"

Make proposals:

-Make new policy proposals
-Suggest changes to existing policies
-Anyone may propose changes to policies or propose new policies.
-Administrative support (eg in formulating the proposal is available from the RIPE NCC upon request)

Before you make proposals you should study the Policy Development Proposal described in this chapter to

understand what phases your proposal will go through.
You should also review the ongoing policy discussions (on the WG mailing lists) to avoid repeating proposals.
You can of course contribute with your comments to these discussions as well.
Try to find out whether your idea is applicable to others as well. (Does it make sense to propose the policy changes?)
Decide whether you want to propose a new policy, propose a change to an existing policy, or do you just want some troubleshooting advice?
What will happen next to your idea? It will go through the four phases described above under the heading "Phases in the Policy Development Process": intake, discussion, review, conclusion.
How much work do you have to do?
Writing the "template proposal". Then a draft document. Posssibly rewording and rewriting.
Arguing and defending your idea.

However, you can get support from the RIPE NCC to do all this. Your contact person is the **RIPE NCC Policy Development Officer** (email**:** ***filiz@ripe.net***) who can coordinate administrative support to help you word your proposal and help with editing. The RIPE NCC will also remind you of upcoming deadlines. They can also supply you with information and statistics. The Policy Development Officer will also coordinate with the appropriate Working Group chairs.
The Working Group Chair will guide the discussions on the mailing list and at the meetings. You will also get support from your colleagues who agree with your proposal.

You might also face opposition from colleagues and competitors who do not agree with your proposal.
Or from colleagues with a "better the devil you know" attitude. Or perhaps no reaction at all.

How long does it take to change policy?

Default duration of the Policy Development Process is 20 weeks. Some phases can be extended or repeated.
The actual implementation of the policy by the RIPE NCC is not part of the "Policy Development Process"
For more details on the implementation, see ***Section 1.4 The Policy Implementation Process*** below.

1.4 The Policy Implementation Process

The policy **implementation process** is as follows: (consensus model) :

1. The RIPE community provides input (who? RIPE meeting, mailing lists open to everyone)
2. The RIPE NCC proposes a yearly Activity Plan and budget based on the input (who? RIPE NCC staff)
3. At the annual RIPE NCC General Meeting (GM) the membership votes on the RIPE NCC Charging Scheme (who? Members =LIRs)

The RIPE community sets and agrees to the policies that the RIPE NCC implements.

1.5 Summary

Although extremely interdependent, **RIPE and the RIPE NCC are different organisations**.
RIPE is an open forum with no formal membership and is an invaluable forum for policy discussions directly relating to IP networking.
All the policies related to IP address space are set by RIPE. You can participate in RIPE and help set the policies.
The RIPE NCC is an independent not-for profit membership organisation supporting its members and the RIPE community.
The RIPE NCC is one of the 5 Regional Internet Registries (RIRs).

Don't forget to:

- **Subscribe to the *address-policy-wg*, ncc-*services-wg* and *db-wg* mailing lists**
  http://www.ripe.net/mailman/
- **Participate in the discussions in working groups mailing lists to help shape IP address policies**
- **Attend the RIPE meetings (if possible) or follow them on webcast to help shape IP address policies**
- **Know where to find the RIPE documents and request forms:**
  http://www.ripe.net/ripe/docs/index.html

References:

RIPE NCC	*http://www.ripe.net/info/ncc/*
RIPE	*http://www.ripe.net/ripe/*
APNIC	*http://www.apnic.net*
AfriNIC	*http://www.afrinic.net*
ARIN	*http://www.arin.net*
LACNIC	*http://www.lacnic.net*
ICANN	*http://www.icann.org*
IANA	*http://www.iana.org*
ASO	*http://www.aso.icann.org/*

RIPE NCC ACTIVITY PLAN 2011
http://www.ripe.net/ripe/docs/ap.html

RIPE NCC BILLING PROCEDURE AND FEE SCHEDULE 2011
http://www.ripe.net/membership/billing/procedure.html

RIPE NCC CHARGING SCHEME 2011
http://www.ripe.net/ripe/docs/charging.html

RIPE NCC BUDGET 2011
http://www.ripe.net/ripe/docs/budget.html

RIPE NCC ANNUAL REPORTS
http://wwwripe.net/info/ncc/ar.html

POLICY DEVELOPMENT PROCESS IN RIPE
https://www.ripe.net/ripe/docs/pdp.html

2. RIPE DATABASE BASICS

2.1 RIPE Database Introduction

The RIPE Database is a public database containing information about IP address space, AS numbers, routing policies, and reverse DNS delegations in the RIPE region. The Ripe Database also contains contact information for all these resources. This information makes the Database an important tool for Internet network management.

> **NOTE:** The data is registered into the RIPE Database by the LIRs within the RIPE region. The RIPE NCC supports the operation of the Database but is not responsible for its contents

The information in the RIPE Database is available to the public for agreed Internet operation purposes under copyright restrictions.

The data in the RIPE Database can be queried by the Whois service.

The Database software was written according to the requirements and specifications set by the RIPE Database Working Group (RIPE DB WG).

2.2 RIPE Database Objects

Records in the RIPE Database are called “objects”. Each object is a list of “attribute-value” pairs displayed in plain text.

The most common objects are **person**, **role**, **inetnum**, **mntner**, **route**, **aut-num** and.**domain**.

A template is a empty form for an object.

To create an object you need to fill in a template. A template is a empty form for an object, as you can see by the next example:

inetnum:	**[mandatory]**	**[single]**	**[primary/look-up key]**
netname:	**[mandatory]**	**[single][**	**lookup key]**
descr:	**[mandatory]**	**[multiple]**	**[ ]**
org:	**[optional]**	**[single]**	**[inverse key]**
country:	**[mandatory]**	**[multiple]**	**[ ]**
admin-c:	**[mandatory]**	**[multiple]**	**[inverse key]**
tech-c:	**[mandatory]**	**[multiple]**	**[inverse key]**
status:	**[mandatory]**	**[single]**	**[ ]**
remarks:	**[optional]**	**[multiple]**	**[ ]**
notify:	**[optional]**	**[multiple]**	**[inverse key]**
mnt-by:	**[mandatory]**	**[multiple]**	**[inverse key]**
mnt-lower:	**[optional]**	**[multiple]**	**[inverse key]**
mnt-routes:	**[optional]**	**[multiple**	**][inverse key]**
mnt-domains:	**[optional]**	**[multiple]**	**[inverse key]**
mnt-irt:	**[optional]**	**[multiple]**	**[inverse key]**
changed:	**[mandatory]**	**[multiple]**	**[ ]**
source:	**[mandatory]**	**[single]**	**[ ]**

This is an example of a template for an inetnum object. To know how you should fill it in, take a look at the example that follows.

```
inetnum:        80.8.4.0 - 80.8.5.255
netname:        FR-FT-WIC
descr:          France Telecom Wanadoo
                Interactive Cable
country:        FR
admin-c:        WICT1-RIPE
tech-c:         WICT1-RIPE
status:         ASSIGNED PA
remarks:        for hacking, spamming or
                security problems send mail to
                security@iwannado.com
mnt-by:         FT-BRX
changed:        hostmaster@iwannado.com 20010828
source:         RIPE
```

The attributes in the **inetnum** object are **`inetnum:`**, **`netname:`**, **`descr:`** and so on. An attribute name always starts on the first column and ends with a colon (**:**). Everything after the colon is the value.

2.3 Querying the RIPE Database

NOTE: There are three common methods to obtain information from the RIPE Database:

- **RIPE Database web interface**
- **Whois client**
- **Glimpse search** (through web interface)

You can also query the RIPE Database using:

- telnet **whois.ripe.net:23** which gives you a shell in which you can run the whois command (useful when no whois client is available) or
- **telnet whois.ripe.net:43** which provides access without a shell to the whois server (useful for scripts).

2.3.1 RIPE Database web interface

The RIPE Database web interface is the most commonly used tool to query the RIPE Database. You can find it at http://www.db.ripe.net/whois.

If you want to look up an object in the RIPE Database using the **web interface**, you can only use **lookup keys** of the object as *search terms*.

NOTE: If you wish to look up an object in the RIPE Database using the **Whois** client, you must use “lookup keys” of the object as *search terms*.

A list of the lookup keys is given below:

OBJECT	KEYS
aut-num	AS number (e.g. AS3333)
route:	route (range, e.g. 86.54/16)
as-set	as-set name (e.g. AS-EBONE)
route-set	route-set name (e.g. RS-HEPNET)
domain	domain name (e.g. over.ripe.net)
inetnum	range of IP addresses e.g 193.0.0.0 - 193.0.0.255; network name e.g.RIPE-NCC
inet6num	range of IPv6 addresses or network name
person	a person's name or NIC-handle, e-mail address, abuse-mailbox
poem	name of poem
mntner	name of mntner object e.g. AMRM1-RIPE-MNT, abuse-mailbox
organistion	organization, org-name, email, abuse-mailbox.
route	internet route e.g. 193.0.0.0/24
role	the name, the NIC-handle, the e-mail address or abuse-mailbox
inet-rtr	Fully qualified domain name without trailing "."
filter-set	Filter set name
peering-set	Peering set name
key-cert	key-cert
irt	irt, e-mail, abuse-mailbox,
organisation	organisation (ID), org-name, e-mail

In **Appendix 6** there is a list of database object templates with the lookup keys marked for each object.

NOTE: When doing a query, the **Whois** client or the **Whois** web interface will only check the "lookup keys" of all the objects in the Database.

Therefore the following queries would give you the **inetnum** object used in section **2.2 Database Objects** since the "**`inetnum`**" attribute and the "**`netname`**" attribute used in the queries are "lookup keys" for the **inetnum** object:

whois 80.8.4.0 - 80.8.5.255
whois FR-FT-WIC
whois 80.8.4.7

(Individual IP addresses can be queried: the most specific (=smallest) **inetnum** object and the most specific **route** object containing that address will be returned.)

The following query would NOT give you any useful results since the "**`descr:`**" attribute is NOT a "lookup key" for the **inetnum** object:

whois France Telecom Wanadoo Interactive Cable ← ***# YOU GET NO RESULTS!***

TIP: To see how "lookup keys" work, compare the above commands with the **inetnum** object and **inetnum** object template in ***Section 2.2 - Database Objects***

How do I use flags when querying the RIPE Database?

The RIPE Database has several optional ***"flags"***, which can be used either alone or in combination when doing a query.
The flags can be entered with the search term, in the search field or you can click on the "Advanced search Form" button and you can use the check boxes to select the flags that you want to use for your

search.

For more information on flags see: *http://www.ripe.net/db/support/whois-refcard.pdf*

Here are some of the most important flags that you can use when querying the RIPE Database. For the complete list, have a look at the document “RIPE Database Queries Quick Reference Card”, at http://www.ripe.net/db/docs.html.

```
Option                                                          Function
-------------------------------------------------------------------------
  [default]                                    most email addresses hidden
  -a                                                 search all databases
  -b                          [only for IP ranges] show only primary key
                           (address range) and abuse-mailbox of contacts
  -B                                  show all email addresses in objects
  -F                                        fast raw output (implies -Fr)
  -G                     group output according to type and not relevance
  -h                                           search alternate server
  -i                                                   inverse look-up
  -l                                find first level Less specific matches
  -L                                        find all Less specific matches
  -m                                find first level More specific matches
  -M                                        find all More specific matches
  -x                                             find only the exact match
  -p                    connect to other port than the default whois port
  -r                                          turn off recursive lookups
  -s                                search databases with source "source"
  -t                           requests template for object of type "type"
  -v                 requests a verbose template for object of type "type"
  -T                                  only look for objects of type "type"
  -k                               keeping state of persistent connections
  -q types                            a list of all available object types
  -HELP                gives a copy of the current `HELP & HOWTO' document
```

2.3.2 Whois web interface

You can query the Whois client in a similar way to the RIPE Database web interface.

Whois client is a command-line tool for UNIX (and UNIX-like) operating systems. It can be downloaded from the RIPE NCC ftp server: *ftp://ftp.ripe.net/tools/ripe-whois-latest.tar.gz*
The address of the RIPE Database Whois server is ***whois.ripe.net.***
If you use the RIPE NCC client you do not have to specify the address of the Whois server when querying the RIPE Database:

whois *search_terms*

If you use other clients you have to specify the address of the Whois server when querying the RIPE Database:

whois –h whois.ripe.net *search_terms*

Especifically: FreeBSD: **whois** -h whois.ripe.net -- *'-t person'*
Sun: **whois** -h whois.ripe.net *'-t person'*
RedHat 7: **whois** -h whois.ripe.net *-t person*
RedHat 6: **whois** *'-t person'*@whois.ripe.net.

Just like in the web interface, you can use optional flags in the whois client, which can be used either alone or in combination when doing a query. These flags are interpreted by the server and not by the client software.

2.3.3 "Glimpse" search

Glimpse is a multi-keyword search facility for all objects and fields in the RIPE Database. Also called the RIPE DB Free-text Search. **This search is text based**, so it is not possible to search for IP addresses or ranges.

This search tool treats the objects in the RIPE Database as text files and will return any objects that contain the character string you typed in. A typical use of Glimpse is finding inetnum objects (address ranges) belonging to a specific company.

The Glimpse search takes more time that Whois, but usually gives more results. You can find Glimpse at: *http://www.ripe.net/db/whois-free.html*

When should I use Glimpse?

You can use Glimpse when you want to query an object using a value that is not a lookup key. When using the "Glimpse" search you do not have to worry about lookup keys because you can query using any part of the object.

For example, in the Glimpse search web interface you can type in the following term:

'France Telecom Wanadoo Interactive Cable'

And you will get the **inetnum** object that you have already seen in ***Section 2.2***

2.3.4 Email addresses in objects hidden in whois query results

Email addresses are not shown in the results of a whois query.

For each of the following object types, the following attributes contain e-mail addresses:

inetnum:	**`notify, changed`**
linet6num:	**`notify, changed`**
route:	**`notify, changed`**
route6:	**`notify, changed`**
organisation:	**`e-mail, notify, changed`**
person:	**`e-mail, notify, changed`**
role:	**`e-mail, notify, changed`**

For each address range returned, if there is at least one "**`abuse-mailbox`**:" attribute in any of the returned objects, the attributes mentioned above will be removed from the output.

If there is no "**`abuse-mailbox`**:" attribute, only "**`notify`**:" and "**`changed`**:" attributes will be filtered out.
If an attribute of an object is changed, a comment will be added, to avoid confusion. Users can turn off this suppression in the following way:

> To show the entire object (including attributes with email) use the **–B** flag when querying the RIPE Database

2.4 Creating Objects in the RIPE Database

There are four methods to create or modify objects in the RIPE Database:

using the "**Startup Tool**": ***http://apps.db.ripe.net/startup/***
OR
using the "**Webupdates**" interface: ***http://www.ripe.net/webupdates***
OR
using the **email** interface: ***auto-dbm@ripe.net***
OR
using "**Syncupdates**": ***http://www.ripe.net/db/syncupdates/***

In this section we explore how to create objects using the person object as an example.

You must create **person** and **mntner** objects before requesting Internet resources (IP addresses, AS Numbers etc.) from the RIPE NCC. These objects must also be created before you or the RIPE NCC IP Resource Analyst creates objects for those resources in the RIPE Database.
The **person** and **role** objects provide contact information for Internet resources. They will be referenced in **inetnum** objects, **aut-num** objects and other objects.

When you create a person object you should consider which of the following four scenarios applies to your situation:

1. I want to create a **person** object for the first time and I don't have a **mntner** yet
   - See section 2.4.1
2. I want to create a **person** object for the first time but I already have a **mntner**
   - See section 2.4.2
3. I want to create an additional **person** object and I already have a **mntner**
   - See Section 2.4.2
4. I want to create an additional **mntner** object
   - See Section 2.4.3

2.4.1 Creating person objects using the "Startup Tool"

The first objects you should create in the Database are the **person** and **mntner** objects. **Person** objects have to be protected (by **mntner** object) so you cannot just create a person object on its own if you don't already have a **mntner** object.
The "Startup Tool" enables you to create a person **mntner** object pair for the first time.

You can find the "Startup Tool" at:

http://apps.db.ripe.net/startup/

Here you see the “Startup Tool” filled out with data for a new person and a new mntner object pair:

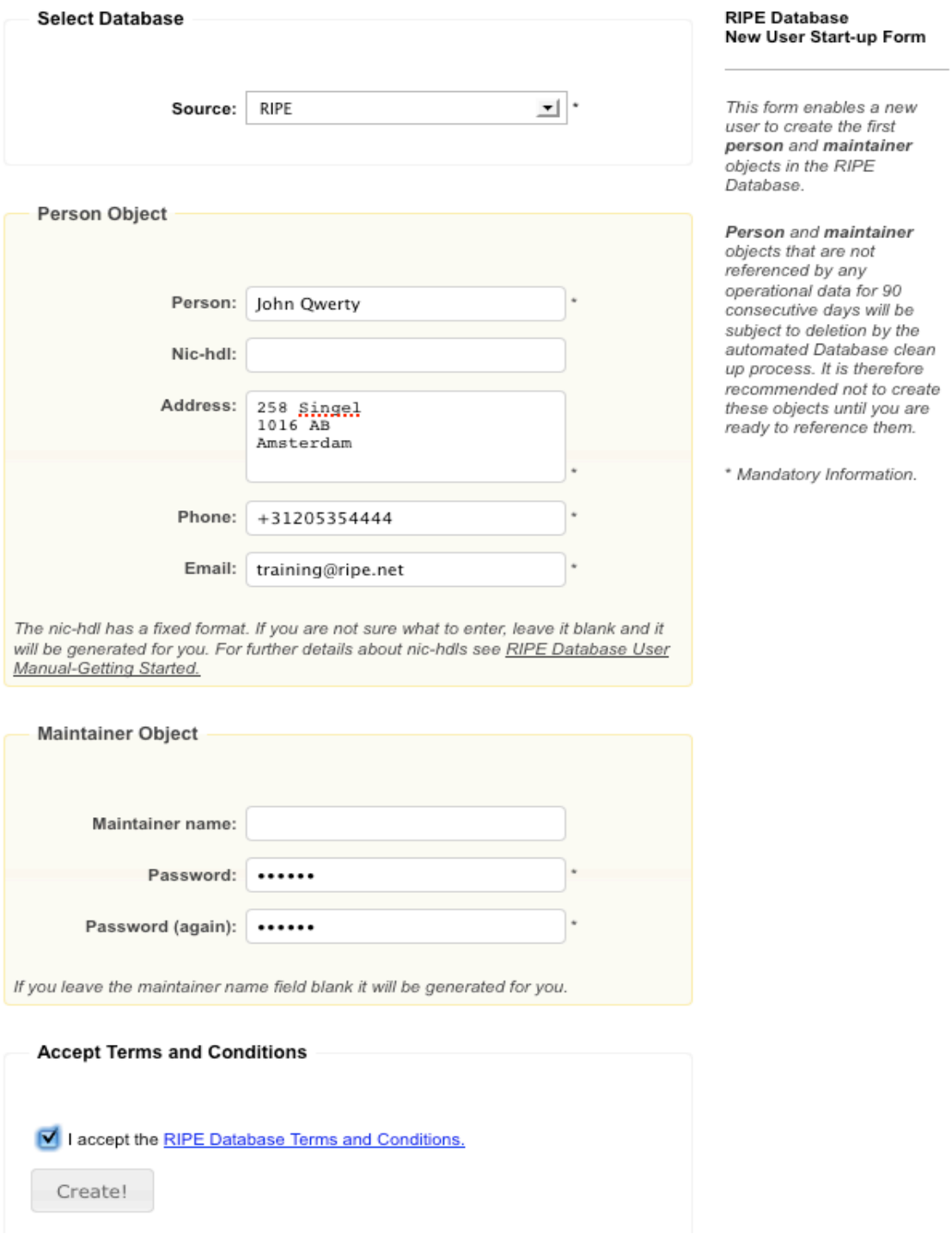

Select Database
Source: RIPE *
Person Object
Person: John Qwerty *
Nic-hdl:
Address: 258 Singel
1016 AB
Amsterdam *
Phone: +31205354444 *
Email: training@ripe.net *
The nic-hdl has a fixed format. If you are not sure what to enter, leave it blank and it will be generated for you. For further details about nic-hdls see RIPE Database User Manual-Getting Started.
Maintainer Object
Maintainer name:
Password: •••••• *
Password (again): •••••• *
If you leave the maintainer name field blank it will be generated for you.
Accept Terms and Conditions
I accept the RIPE Database Terms and Conditions.
Create!
RIPE Database
New User Start-up Form
This form enables a new user to create the first person and maintainer objects in the RIPE Database.
Person and maintainer objects that are not referenced by any operational data for 90 consecutive days will be subject to deletion by the automated Database clean up process. It is therefore recommended not to create these objects until you are ready to reference them.
* Mandatory Information.

***Fig. 2-1** The Startup Tool for creating your first person object and mntner object pair*

phone: the phone number needs to be written in accordance to the international standards (country code first).

nic-hdl: The nic-hdl is a unique person object identifier that references contact details for a unique person. It avoids ambiguities as there is only one and unique nic-hdl for each person, even for people with the same name. The nic-hdl field has a strict format. If you are not sure what to enter, leave it blank. This will be generated for you.

mntner name: The mntner name will also be generated if left blank. (For more information on mntners see section 2.4.3)

password: Choose a secure password and remember it. The password protects and authenticates the **person** object, so that unathorised people cannot update it or delete it. You will have to supply the password every time you want to update this person object in the future.
Funny tool will use this password as the password of the **mntner** object it creates. This **mntner** object will protect the person object.

Click on submit and you have just created a **person** object and a **mntner** object!

You will see them in following window (see next page):

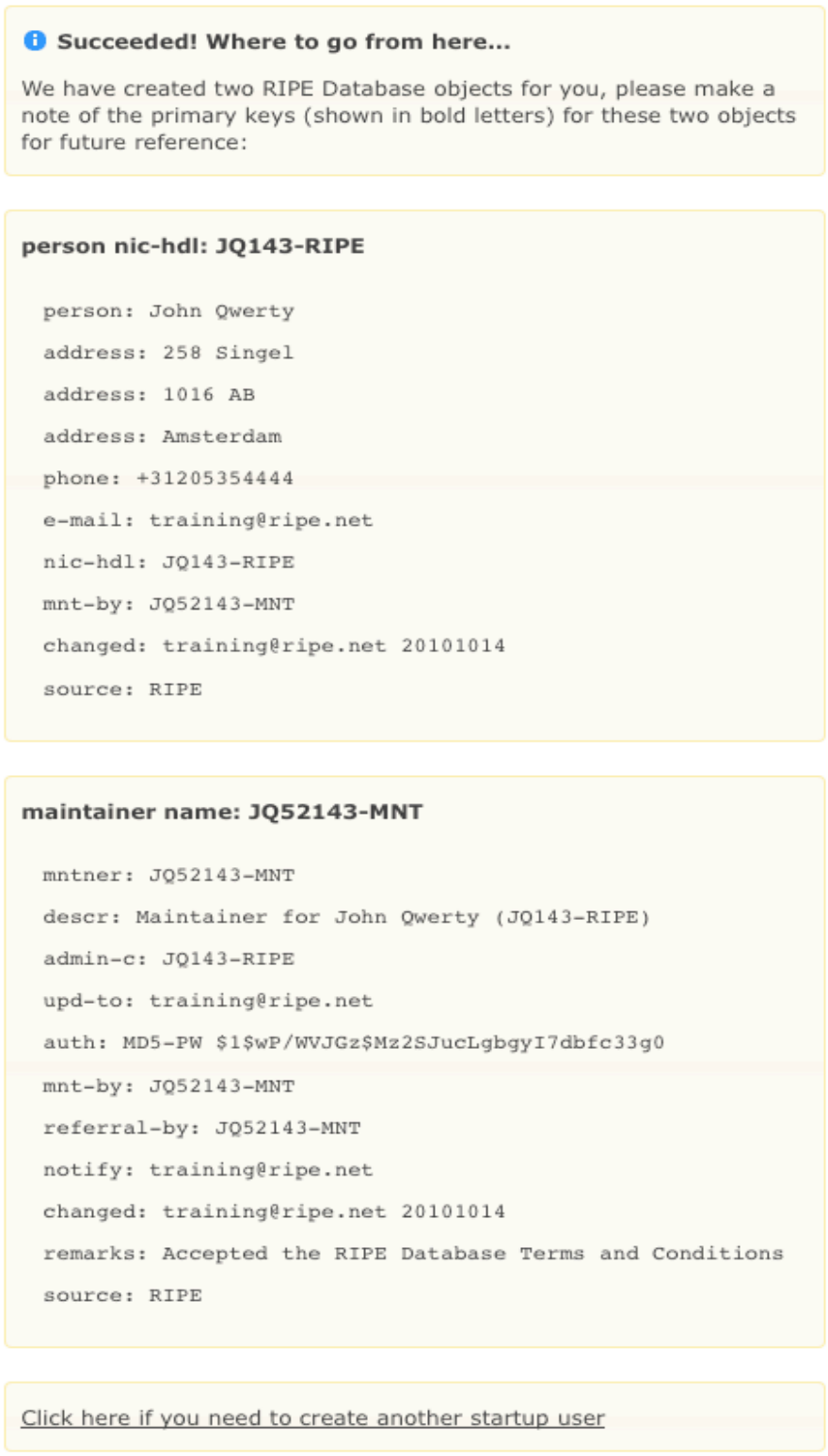
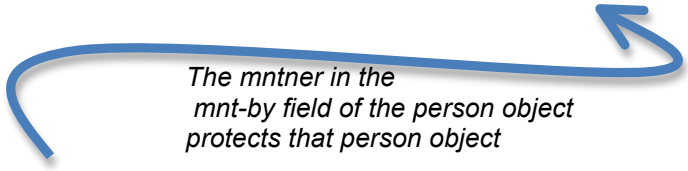

Succeeded! Where to go from here...
We have created two RIPE Database objects for you, please make a note of the primary keys (shown in bold letters) for these two objects for future reference:
person nic-hdl: JQ143-RIPE
person: John Qwerty
address: 258 Singel
address: 1016 AB
address: Amsterdam
phone: +31205354444
e-mail: training@ripe.net
nic-hdl: JQ143-RIPE
mnt-by: JQ52143-MNT
changed: training@ripe.net 20101014
source: RIPE
maintainer name: JQ52143-MNT
mntner: JQ52143-MNT
descr: Maintainer for John Qwerty (JQ143-RIPE)
admin-c: JQ143-RIPE
upd-to: training@ripe.net
auth: MD5-PW 1wP/WVJGz$Mz2SJucLgbgyI7dbfc33g0
mnt-by: JQ52143-MNT
referral-by: JQ52143-MNT
notify: training@ripe.net
changed: training@ripe.net 20101014
remarks: Accepted the RIPE Database Terms and Conditions
source: RIPE
Click here if you need to create another startup user

***Fig. 2-2** Notification: Successfully created a person and a mntner object with the Startup Tool*

If you query the RIPE Database you can check the objects you have just created:

```
person:          John Qwerty
address:         258 Singel
address:         1016 AB
address:         Amsterdam
phone:           +31205354444
e-mail:          training@ripe.net
nic-hdl:         JQ141-RIPE
mnt-by:          JQ-MNT
source:          RIPE # Filtered
```



The mntner in the mnt-by field of the person object protects that person object

Encrypted version of the password you typed in the "Startup Tool"

```
mntner:          JQ-MNT
descr:           Maintainer for John Qwerty (JQ141-RIPE)
admin-c:         JQ141-RIPE
auth:            MD5-PW $1$t62YYm/2$PjFPY2s8rSbr10kEpARmx1
mnt-by:          JQ-MNT
referral-by:     JQ-MNT
remarks:         Accepted the RIPE Database Terms and Conditions
source:          RIPE # Filtered
```

For more information on mntners, authentication and protecting objects see section 2.4.3

2.4.2 Creating person objects using “Webupdates”

“”Webupdates” is a web-based tool to update the RIPE Database that you can find at:

http://www.ripe.net/webupdates OR https://www.ripe.net/webupdates

“Webupdates” provides a web-based graphical user interface, with the functionality for:

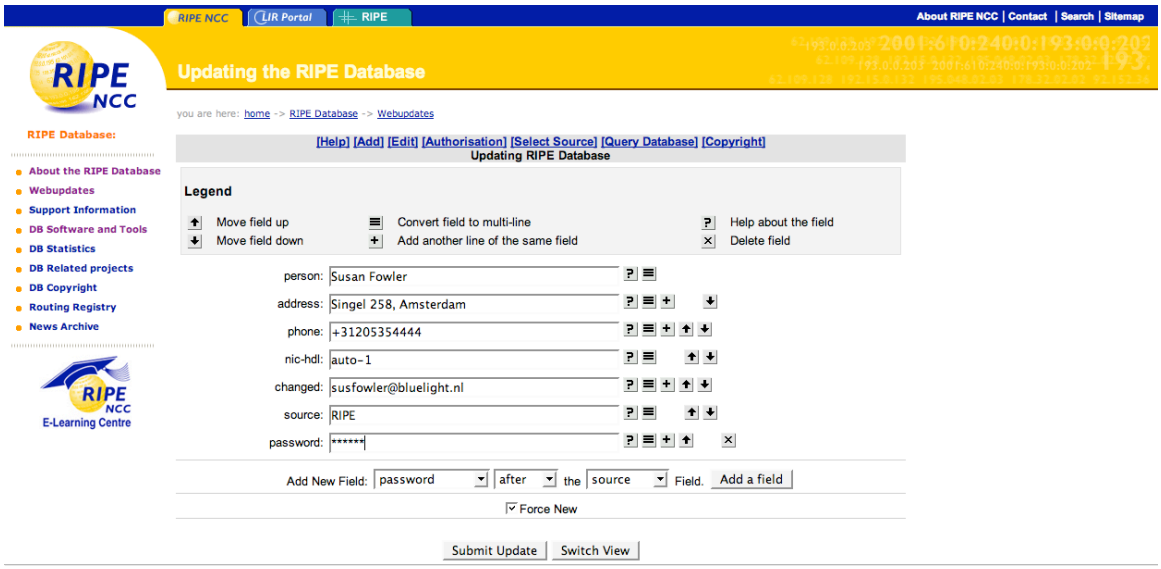
- Adding (creating) objects, deleting or modifying existing objects.
- Adding or deleting attributes in an object or changing their order in an object.
- Providing password-based authentication for updates.

At the top of the “Webupdates” web page, there is a menu with a list of actions you can choose from.

[Help]: Displays the help screen.
[Add]: Allows you to add new objects in the database.
[Edit]: Allows you to modify or delete existing entries in the database.
[Authorisation]: Allows you to provide a password for updates.
[Select Source]: Allows you to select a different database to update (e.g. the RIPE Test Database).
[Query Database]: Redirects you to the database query web interface.
[Copyright]: Displays copyright information.

To create a person object using Webupdates click [Add] on the Webupdate page and then select “person” from the drop-down menu gives you an empty template to create the object.

Here is an example of a filled-out template:



person: you should fill out your name in this field. Don’t use any titles (Mr, Mrs, Dr)

address: the full postal address is specified using multiple address fields or a multiline address field

phone: needs to be in accordance to the international standards (country code first) and it needs to be valid so it can be used to reach you at work

nic-hdl: the nic-handle is a unique person identifier in the database

How do I obtain a nic-hdl?

The nic-hdl is one of the mandatory attributes of the person object. Whenever a **person** or **role** object is referenced in another object they are referenced by their **nic-hdl** and not by their name. It is basically the person's ID and avoids ambiguity of persons with the same name.

Here is an example of a nic-hdl:

JS484-RIPE

The first two letters stand for the person's name (example John Smith). The number refers to the number of people registered in the Database whose first and last names start with JS. In this case, John Smith is the 484th person. This is followed by "-RIPE" as it is registered in the RIPE database

A **nic-hdl** can be obtained in the following way:

> When creating a **person** or **role** object you should fill out the **nic-hdl** field with a placeholder: ***AUTO-{number}{initials}***

AUTO-nn[xxxx]
e.g.: **nic-hdl: AUTO-1**
or: **nic-hdl: AUTO-1AB**

The Database software will either take initials from the person's name, or use initials you want to force if they are stated instead of **xxxx**.

changed: your e-mail address must be specified in this field. The database robot will add the date of creation or modification of the object in the changed field

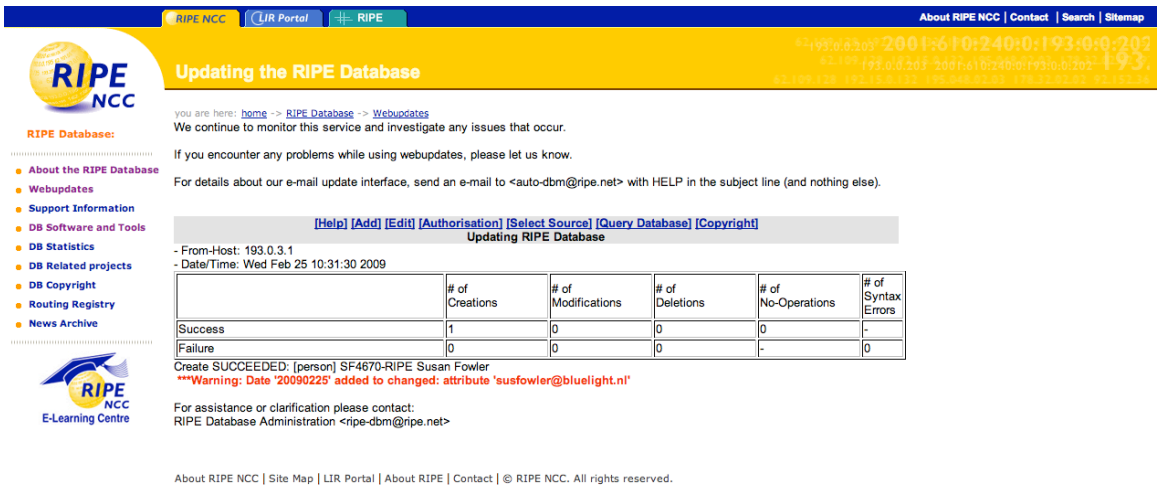
source: specifies the Registry database where the object can be found (in this case "RIPE")

mnt-by: here you should type the name of your maintainer.

password: If the mntner which protects this object (ie the mntner in the mnt-by field) has password authentication, then you should fill in the clear text version of this password here. If your mntner has PGP authenticaton, then the password field is not needed.

> If you do not wish to fill out an optional field, delete the whole line, including the attribute left of the colon.

After you finish filling out the template, click on the "Submit update" button and you create the person object.


RIPE NCC
LIR Portal
RIPE
About RIPE NCC | Contact | Search | Sitemap
Updating the RIPE Database
RIPE Database:
About the RIPE Database
Webupdates
Support Information
DB Software and Tools
DB Statistics
DB Related projects
DB Copyright
Routing Registry
News Archive
E-Learning Centre
you are here: home -> RIPE Database -> Webupdates
We continue to monitor this service and investigate any issues that occur.
If you encounter any problems while using webupdates, please let us know.
For details about our e-mail update interface, send an e-mail to <auto-dbm@ripe.net> with HELP in the subject line (and nothing else).
[Help] [Add] [Edit] [Authorisation] [Select Source] [Query Database] [Copyright]
Updating RIPE Database
- From-Host: 193.0.3.1
- Date/Time: Wed Feb 25 10:31:30 2009
# of Creations
# of Modifications
# of Deletions
# of No-Operations
# of Syntax Errors
Success 1 0 0 0 -
Failure 0 0 0 - 0
Create SUCCEEDED: [person] SF4670-RIPE Susan Fowler
***Warning: Date '20090225' added to changed: attribute 'susfowler@bluelight.nl'
For assistance or clarification please contact:
RIPE Database Administration <ripe-dbm@ripe.net>
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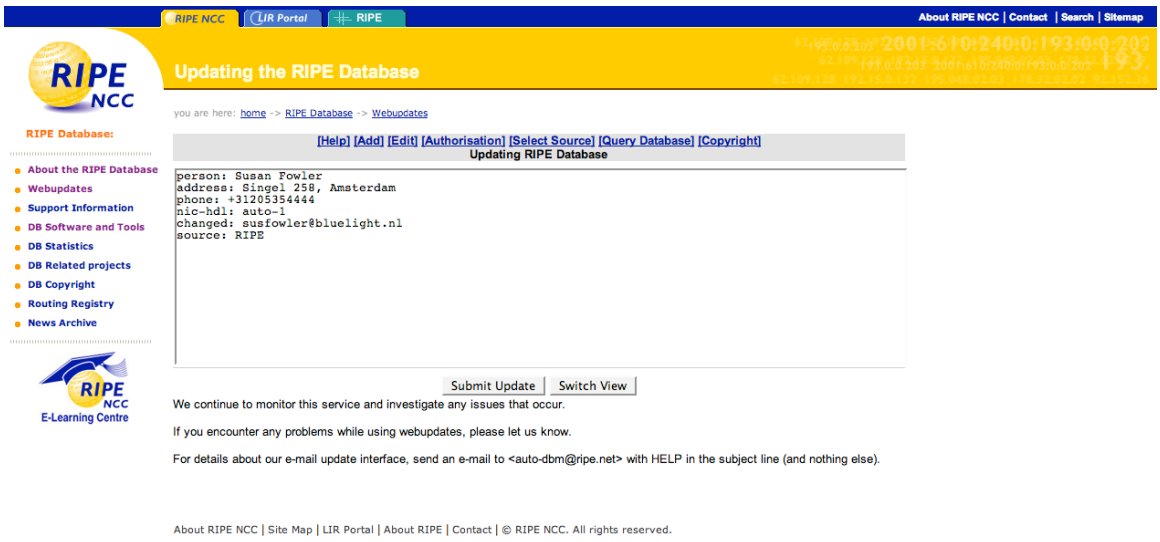
Remember your nic-hdl (here SF4670-RIPE), as you need to use it every time you refer to your person object.

And if my mntner has PGP authentication?

If the mntner has a PGP authentication then (instead of adding the password field) should click on the "Switch View" button to display the entire object in one field. You get a screen like this:


RIPE NCC
LIR Portal
RIPE
About RIPE NCC | Contact | Search | Sitemap
Updating the RIPE Database
RIPE Database:
About the RIPE Database
Webupdates
Support Information
DB Software and Tools
DB Statistics
DB Related projects
DB Copyright
Routing Registry
News Archive
E-Learning Centre
you are here: home -> RIPE Database -> Webupdates
[Help] [Add] [Edit] [Authorisation] [Select Source] [Query Database] [Copyright]
Updating RIPE Database
person: Susan Fowler
address: Singel 258, Amsterdam
phone: +31205354444
nic-hdl: auto-1
changed: susfowler@bluelight.nl
source: RIPE
Submit Update
Switch View
We continue to monitor this service and investigate any issues that occur.
If you encounter any problems while using webupdates, please let us know.
For details about our e-mail update interface, send an e-mail to <auto-dbm@ripe.net> with HELP in the subject line (and nothing else).
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Now you can sign the **person** object with the PGP key of the **mntner**, and then click on Submit Update to create the **person** object.

There is another way to supply the authorization. Instead of adding an extra password field and filling in the mntner's password you can also do the following:
Selecting **[Authorisation]** from the menu enables you to enter a clear-text password that can be used on all of your updates during the time specified. You can enter the password to be used and for how long it will be remembered by the application. When you click on **Register,** the password you entered will be stored on your computer as an encrypted cookie.

You can also provide a password for each update by adding an extra "password:" field to the object and entering your clear-text password to the input field provided, as shown in the examples above.

NOTE: Before updating or deleting an object in the RIPE Database using "Webupdates" you must use the **[Authorisation]** menu to enter the password of the maintainer that is protecting it.

And if I want to edit my object?

You can use also use Webupdates to edit already existing objects.

Things to keep in mind when modifying database objects:

- keep the same primary key*
- add the **changed:** line to the new version of object (e.g. **changed:** jan@bluelight.nl)
- keep the old **changed:** lines in to show history (**never** remove 1st **changed:** line)
- include authentication - PGP signature (only when using e-mail interface)
-

*If you change the primary key of an object you are not modifying the object but creating a second object with a different primary key. See ***Appendix 6*** for a list of Database object templates. The primary key is marked for each one of them.
You cannot change the primary key of an object. If you modify the primary key you will create a new object.

2.4.3 The mntner object

mntner objects protect other objects in the RIPE Database.

You should include the following attribute in objects to be protected by a **mntner** object:

mnt-by: name_of_mntner

Only individuals who know the password of the **mntner** object can change your objects.

When someone tries to update (create, modify, delete) a Database object that includes a **"mnt-by**: name-of-your-maintainer" line, the update request (email or web) has to contain the correct authentication token (password, signature).
The Database server will compare the authentication supplied with in the "**auth:**" attribute of the **mntner** object that is referenced in the object's **mnt-by** attribute in order to determine whether or not they are authorised to make the update.

It is mandatory to include a "**mnt-by**" attribute in every database object.

ALL your objects have to be protected!

In additional to authentication details, the **mntner** object contains information on contact persons and notification details. Therefore **mntner** objects can also be used to notify you of any changes to your objects.

You can create a **mntner** object just like any other object in the RIPE Database.

- Read the relevant documents and decide on the authentication method.
- Obtain a template of a **mntner** object by typing: **-t mntner**
  at the RIPE DB web interface: *http://www.ripe.net/whois*
- Fill in the template and send it to ***auto-dbm@ripe.net***.

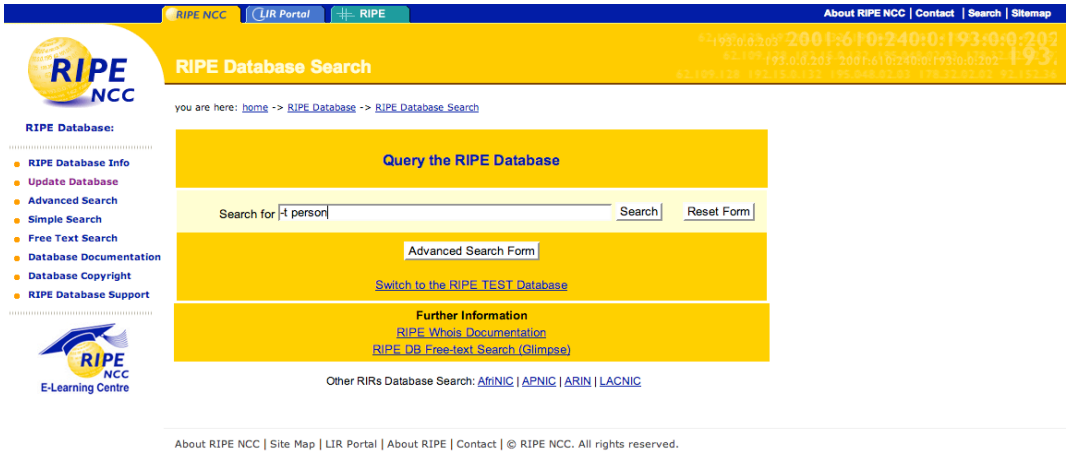
OR:

- Read the relevant documents and decide on the authentication method.
- Create your **mntner** object using "Webupdates"

See ***Section 10.2 – Protecting Database Objects*** for more details.

2.4.4 Creating objects using the email interface

To create an object in the RIPE Database via the email interface you need to obtain an object template (empty form) at http://www.ripe.net/whois. In the search field you have to type the flag –t followed by the name of the object you wish to create. In the following example we create a person object:


RIPE NCC
LIR Portal
RIPE
About RIPE NCC | Contact | Search | Sitemap
RIPE Database Search
you are here: home -> RIPE Database -> RIPE Database Search
RIPE Database:
RIPE Database Info
Update Database
Advanced Search
Simple Search
Free Text Search
Database Documentation
Database Copyright
RIPE Database Support
E-Learning Centre
Query the RIPE Database
Search for -t person
Search
Reset Form
Advanced Search Form
Switch to the RIPE TEST Database
Further Information
RIPE Whois Documentation
RIPE DB Free-text Search (Glimpse)
Other RIRs Database Search: AfriNIC | APNIC | ARIN | LACNIC
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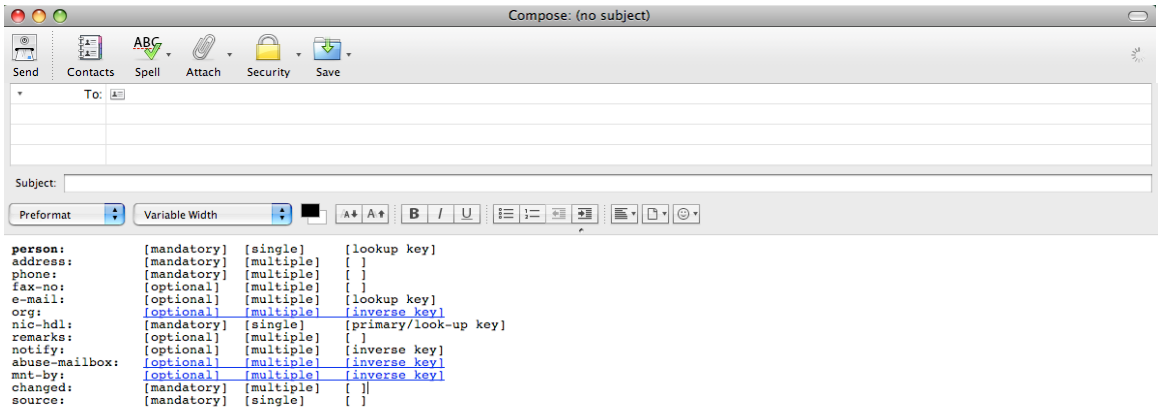
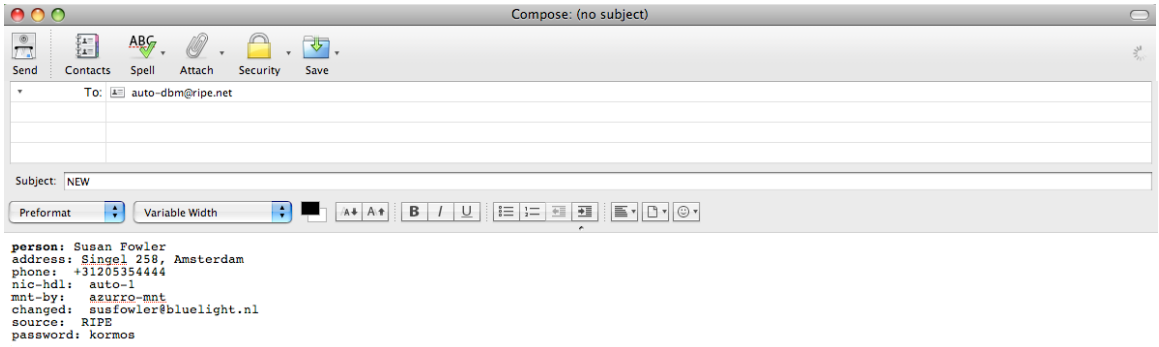
After clicking "search", you will get the template with the attributes to create a person object.

Paste the template in to an email and before you complete the template, make sure you **delete the information from the mandatory attributes**. The object also has optional attributes, which if you do not want to use you need to delete them from the template.
Make sure you do not include any empty objects in your email.



After removing this information, fill in your template, according to the example bellow, and send it to the Database robot: auto-dbm@ripe.net.
The subject of your email should be “NEW”, so the robot knows that it is a new request.



A few minutes after sending the email, you will receive an email confirmation back from the Database robot, once your request has been processed. It is a “Summary of update” message, containing:

- Number of objects found in the email
- Number of objects processed **successfully**
- Number of objects processed with **errors**
- Object templates with errors clearly marked and explained at the appropriate attribute line.

The error report clearly identifies the correction that needs to be made.

To create an object in the RIPE Database via the “e-mail interface” you must

- obtain an object template (empty form) using the **–t** flag
  at this URL *http://www.ripe.net/whois* type: **-t <object type>**
- fill it out
- send it to: ***auto-dbm@ripe.net***

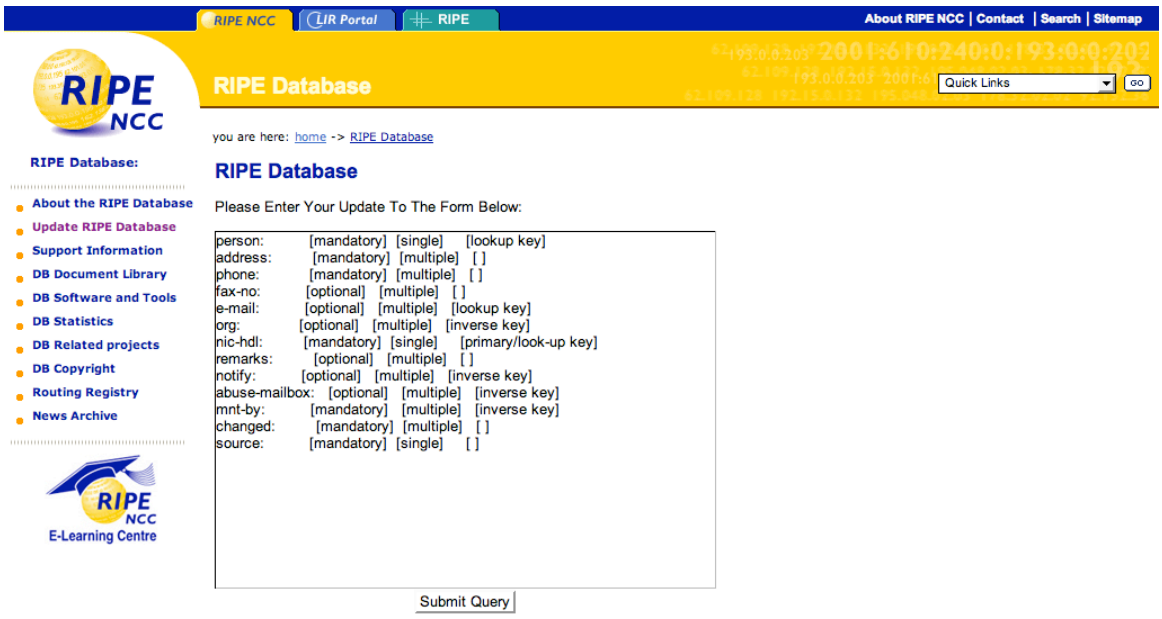
2.4.5. Creating objects using the Syncupdates

The Syncupdates tool allows you to create and modify objects in the Database in a similar way to the email interface but using a web interface.
In order to create your object, you need to get the template from http://www.ripe.net/whois and follow the same procedure as for using the email interface. In the search field you have to type the flag –t followed by the name of the object you wish to create.

After submitting, you will get the template with the attributes to create a person object.

In the Database homepage you can find a link to the Syncupdates tool or type in your browser http://www.ripe.net/db/syncupdates

Paste the template you copied in to the text window you find on the Syncupdates page.



Make sure that before you complete the template, you **delete the information from the mandatory attributes**. The object also has optional attributes, which if you do not want to use you need to delete them from the template.
Empty attributes cannot be included in the final template. After removing this information, fill in your template and, once completed, click the “submit query” button.

Immediately on the screen you will get a “summary of update” from the Database that will tell you if the object was created or not.

```
 - From-Host: 193.0.3.1
 - Date/Time: Wed Feb 25 11:34:09 2009


SUMMARY OF UPDATE:

Number of objects found:                  1
Number of objects processed successfully:  1
  Create:         1
  Modify:         0
  Delete:         0
  No Operation:   0
Number of objects processed with errors:   0
  Create:         0
  Modify:         0
  Delete:         0
  Syntax Errors:  0


DETAILED EXPLANATION:


~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
The following object(s) were processed SUCCESSFULLY:


---
Create SUCCEEDED: [person] SF4673-RIPE  Susan Fowler
***Warning: Date '20090225' added to changed: attribute 'susfowler@bluelight.nl'


***Info: Authorisation for  [person] auto-1
         using mnt-by:
         authenticated by: azurro-mnt

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~


For assistance or clarification please contact:
RIPE Database Administration <ripe-dbm@ripe.net>
```

There might be some **warning message**, which will not prevent the object from being created, but it may require your attention.
If there is an **error message**, your object was not created. First, you must correct the error that is specified in the message and then submit the corrected template.

References:

RIPE DATABASE
http://www.ripe.net/whois

RIPE DATABASE DOCUMENT LIBRARY
http://ripe.net/db/docs.html

RIPE NCC DATABASE USER MANUAL: GETTING STARTED
http://www.ripe.net/ripe/docs/db-start.html

RIPE DATABASE QUERIES REFERENCE CARD
http://www.ripe.net/db/support/whois-refcard.pdf

RIPE NCC DATABASE REFERENCE MANUAL
http://www.ripe.net/ripe/docs/databaseref-manual.html

RIPE DATABASE TERMS AND CONDITIONS
http://ripe.net/ripe/docs/terms-conditions.html

RIPE DATABASE FAQ
http://www.ripe.net/info/faq/db/main.html

RFC 2622: ROUTING POLICY SPECIFICATION LANGUAGE (RPSL)
ftp://ftp.ripe.net/rfc/rfc2622.txt

RFC 2650: USING RPSL IN PRACTICE
ftp://ftp.ripe.net/rfc/rfc2650.txt

RFC 2725: ROUTING POLICY SYSTEM SECURITY
ftp://ftp.ripe.net/rfc/rfc2725.txt

3. HOW TO SET UP AN LIR. FIRST ALLOCATION

Overview

In this section we explain all the steps in the process of becoming a Local Internet Registry (LIR) and procedure for receiving your first allocation from the RIPE NCC and having your first address space assignment approved.
.

> Only RIPE NCC members (LIRs) can receive Internet resources directly from the RIPE NCC.

3.1 How to Set up an LIR

Have a look on our website for a detailed description of how to become an LIR:

http://www.ripe.net/membership

These are the 5 steps to follow in order to become an LIR:

1. Fill out the Application Form online
2. RIPE NCC will send you a contract via DHL
3. Sign the contracts and send back to the RIPE NCC with the DHL airway bill provided. Make sure to also include a copy of your company registration papers.
4. Transfer the money for the start-up fee
5. Once we have received the contracts, registration papers and start-up fee, you will receive your log-in details for the LIR Portal and you can start making requests for address space and other resources.

More details about billing will are provided in ***Section 17.2 - Billing Procedure***. All billing queries should be sent by e-mail using the following address: ***billing@ripe.net***

Registry Identification (Reg ID)

Once you are registered as a new LIR you will receive a Registry Identifier (Reg ID) which is used to identify the LIR as a registry. This Reg ID may be chosen by the LIR. The Reg ID is for RIPE NCC internal use, and for communicating with the LIR.

The format of the Reg ID is: **<country code>.<registry name>**
(e.g. **nl.bluelight**)

Once the organisation is established as an LIR, every e-mail you send to ***hostmaster@ripe.net*** and ***lir-help@ripe.net*** must include a **Reg ID** either in the mail header or in the body of the message, preferably at the top of the message.

> Any messages not from **LIR Contact Persons** or without a **Reg ID** or will be rejected.

Registry File Information and Contact Persons

The RIPE NCC requires the following contact information from each LIR:

- General organisation contact information (address, telephone, fax, e-mail)
- Names of contact persons (with the **nic-hdl** from the RIPE Database)
  see ***Section 2.4*** for definition of **nic-hdl**
- Billing information (including VAT number if billing address is in the EU)

Only the general contact information will be publicly accessible on the RIPE NCC web site. Contact and Billing information are not published!

.

RIPE NCC has an internal "**reg file**" on each LIR. **LIR Contact Persons** are registered in this file.

Only the **registered LIR Contact Persons** of an LIR can request address space

Using the **LIR Portal** LIRs can edit the "reg file" including Contact Persons

Make sure to **sign all e-mail messages** stating your full name and not only your job title and always include your Reg ID.

Each LIR contact person must have a person object registered in the RIPE Database. Contact persons registered in RIPE NCC internal files ("reg files") are not automatically updated when LIR staff make changes in the RIPE Database.

It is possible to use a "**role**" object, to specify a group of people (contact persons), and then add this **role** object's **nic-hdl** as "Contact for the LIR" in the "reg" file via the "**General menu**".of the **LIR Portal**.

Contact information should be updated by the LIR via the RIPE NCC's **LIR Portal** (see ***Section 9 - LIR Portal***). If you are unable to activate your account for the LIR Portal or if you have any questions about the LIR Portal please contact ***lir-help@ripe.net***.

Membership announcement list

The RIPE NCC requires all members to be subscribed to the announcement lists:
ncc-announce@ripe.net

This list is used for sending out announcements aimed at the management within an LIR. e.g. billing charge changes. The list is also used for sending out important announcements about informational issues such as RIPE documents, Training Courses, RIPE Meetings, important policies, etc.

Each LIR should provide the RIPE NCC with an e-mail address for the announcement list. It is assumed that at least one representative of each LIR follows the information sent to the list. You can

unsubscribe or change the subscribed address for your LIR via the **LIR Portal** (See ***Section 9 - LIR Portal***)

We strongly recommend that at least one representative of your LIR follow these two lists as well:

- address-policy-wg@ripe.net

This is the main mailing list to discuss and develop RIPE policies.

- ncc-services-wg@ripe.net

This is the mailing list where the RIPE NCC services are discussed.

3.2 Terminology

Allocations and assignments are the two most important terms when talking about using address space:

Allocation: Address space set apart by RIPE NCC for an LIR's future use: for their End Users and their own infrastructure. RIPE NCC **>>>** LIR

Assignment: Address space taken by an LIR from their allocation and given to an End User or to the LIR's own infrastructure. LIR **>>>** End User or LIR **>>>** to itself

LIRs may only assign addresses from their allocation with the approval of the RIPE NCC or if they have an Assignment Window (AW) !

Having an allocation does not automatically mean that those addresses can be used immediately!

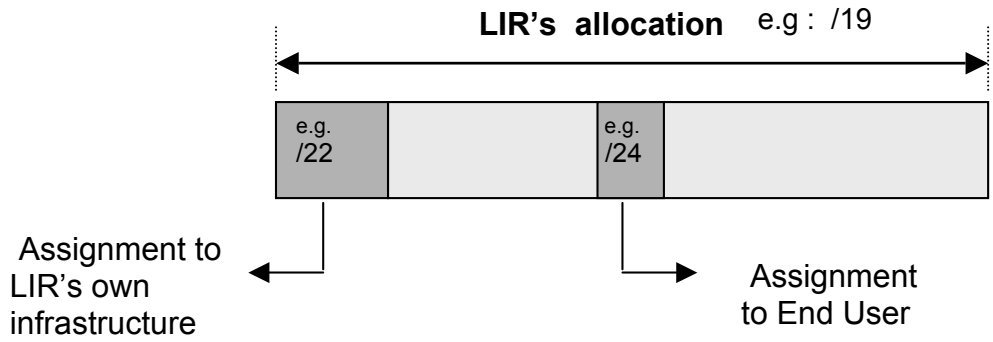


Fig. 3-1 Allocation and Assignments

All allocations and assignments in the RIPE NCC Service region must be registered in the RIPE Database.

LIRs may only assign addresses from their allocation with the approval of the RIPE NCC or if they have an Assignment Window (AW). See ***Section 7 – Assignment Window***

Having an allocation does not automatically mean that those addresses can be used immediately. You need to make assignments from your allocation first. Depending on the size of your AW, these assignments may have to be requested from the RIPE NCC.

3.3 First Allocation Request and First Assignment Request(s)

> The LIR will receive the first allocation and the first assignment approval at the same time.

The steps to receive the first allocation and first assignments are:

1. Complete the "***PROVIDER AGGREGATABLE (PA) ASSIGNMENT REQUEST FORM"*** for the first assignment.
2. Send to ***hostmaster @ripe.net***…or submit request(s) **online** via the **LIR Portal**.
3. RIPE NCC issues ticket numbers.
4. Complete the "***IPV4 FIRST ALLOCATION REQUEST FORM"***. Include the assignment ticket number.
5. Send to ***hostmaster@ripe.net***…or submit the request **online** via the **LIR Portal**.
6. RIPE NCC will evaluate and approve the first allocation and the assignment requests.
7. The minimum allocation size is /21.

The LIR will receive the first allocation and the first assignment approval at the same time.

The RIPE NCC IP Resource Analysts enter the allocation **inetnum** object into the RIPE database for the LIR.
The whole allocation can be announced immediately. The LIR can create a route object for the whole allocation.

> Since the LIR at this point does not yet have an AW (see ***Section 7 Assignment Window***), every assignment from the LIR's allocated space needs to be approved by the RIPE NCC.

(See ***Section 7 Assignment Window***)

For more details see the ***Section 4 – Assigning (PA) Address Space***

Please note that as a result of implementing the ***RIPE Policy Proposal 2009-03***, also known as the ***'Run out Fairly Proposal'*** the Allocation Periods (Planning Periods) will get successively shorter over the course of 2010 and 2011.

	Allocation Period
1 Jan 2010	12 months
1 Jul 2010	9 months
1 Jan 2011	6 months
1 Jul 2011	3 months

References:

***NEW MEMBERS' DOCUMENTATION*:**
http://www.ripe.net/membership/index.html

IPV4 ADDRESS ALLOCATION AND ASSIGNMENT POLICIES IN THE RIPE NCC SERVICE REGION
http://www.ripe.net/ripe/docs/ipv4-policies.html

IPV4 FIRST ALLOCATION REQUEST FORM
http://www.ripe.net/ripe/docs/first-allocation.html

SUPPORTING NOTES FOR THE IPV4 FIRST ALLOCATION REQUEST FORM
http://www.ripe.net/ripe/docs/first-allocation-support.html

PROVIDER AGGREGATABLE (PA) ASSIGNMENT REQUEST FORM
http://www.ripe.net/ripe/docs/iprequestform.html

SUPPORTING NOTES FOR THE PROVIDER AGGREGATABLE (PA) ASSIGNMENT REQUEST FORM
http://www.ripe.net/ripe/docs/iprequestsupport.html

RUN OUT FAIRLY PROPOSAL 2009-03
http://ripe.net/ripe/policies/proposals/2009-03.html

4. REQUESTING (PA) ADDRESS SPACE

Even if the LIR has an **allocation** from the RIPE NCC, it **cannot directly use** those IP addresses. The addresses to be used by the LIR or its End Users must be **assigned** first.

If the LIR has an **Assignment Window (AW)** it can assign a limited number of addresses without the RIPE NCC's approval. See ***Section 7 - Assignment Window.***

4.1 Overview

In this section we shall discuss how to request approval from the RIPE NCC for a **Provider Aggregatable (PA or non-portable) assignment** from your allocation.

For a definition of **Allocation** and **Assignment** see ***Section 3.2 –Terminology.***

PA assignment is the most common form of assignment. PA assignments are made from the allocation of the LIR.
To be able to assign address space the LIR staff must be familiar with the steps of the Assignment Process between the RIPE NCC, the LIR and the End User. This section describes how to complete the request form correctly and how to interact with the Registration Services Department (IP Resource Analysts) of the RIPE NCC. The assignment process itself is outlined here.

How the RIPE NCC IP Resource Analysts will evaluate the request is discussed in **Section 5 - *Evaluation of Address Space Requests.***

4.2 Steps of the Assignment Process

Steps that an **LIR** needs to go through to make an assignment are outlined in ***Fig 4-1*** on the next page.

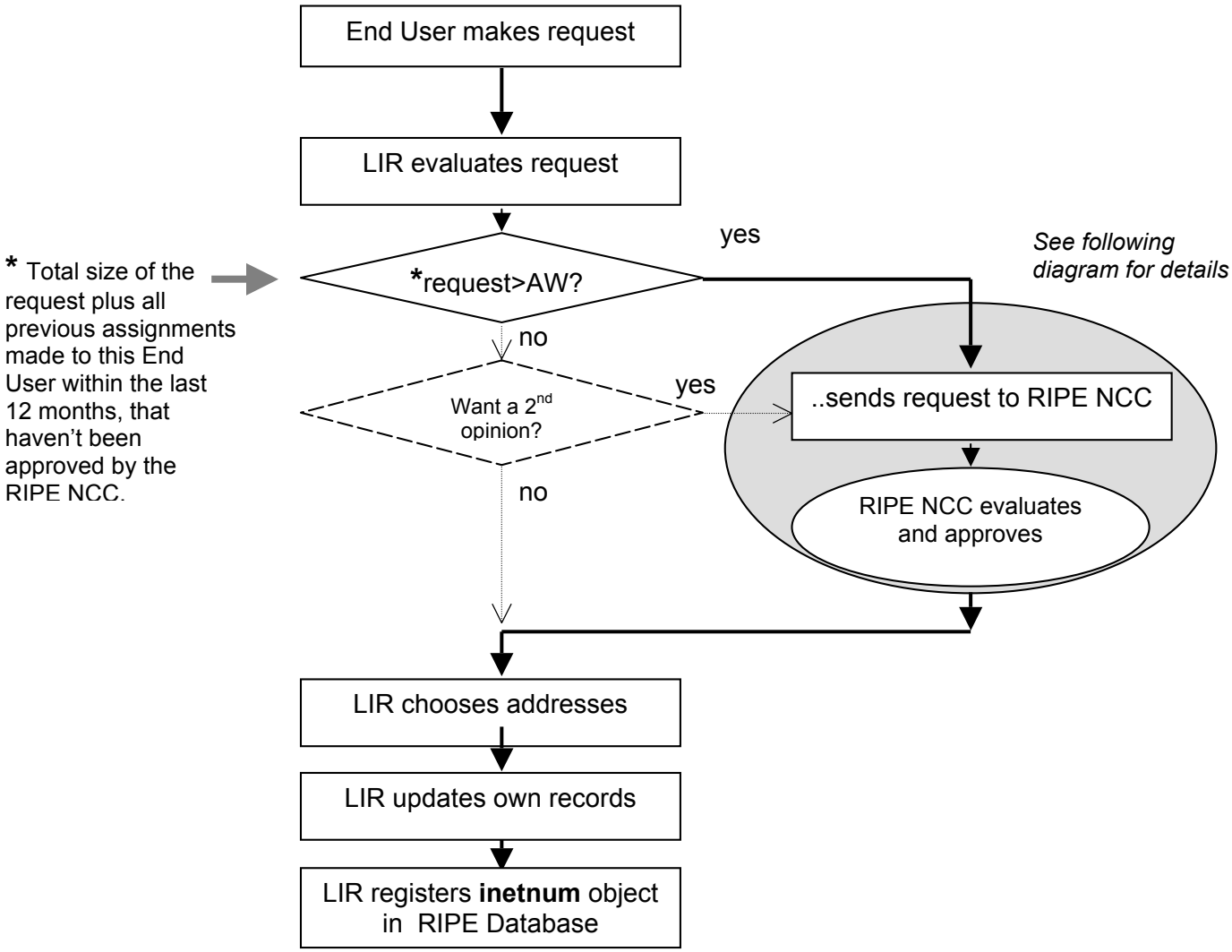

End User makes request
LIR evaluates request
* Total size of the request plus all previous assignments made to this End User within the last 12 months, that haven't been approved by the RIPE NCC.
*request>AW?
yes
See following diagram for details
no
Want a 2nd opinion?
yes
..sends request to RIPE NCC
RIPE NCC evaluates and approves
no
LIR chooses addresses
LIR updates own records
LIR registers inetnum object in RIPE Database

***Fig. 4-1** The Assignment Process*

Notes:

If your LIR's AW = 0, then the right branch of this flow diagram describes the steps to get an assignment approved.

If your **AW is larger than zero**, then please also read ***Section 7 - Assignment Window*** before requesting any assignments.

If you need an assignment for your LIR's own infrastructure read the sub-section **7.7** ***AW for LIR's Own Infrastructure*** **.**

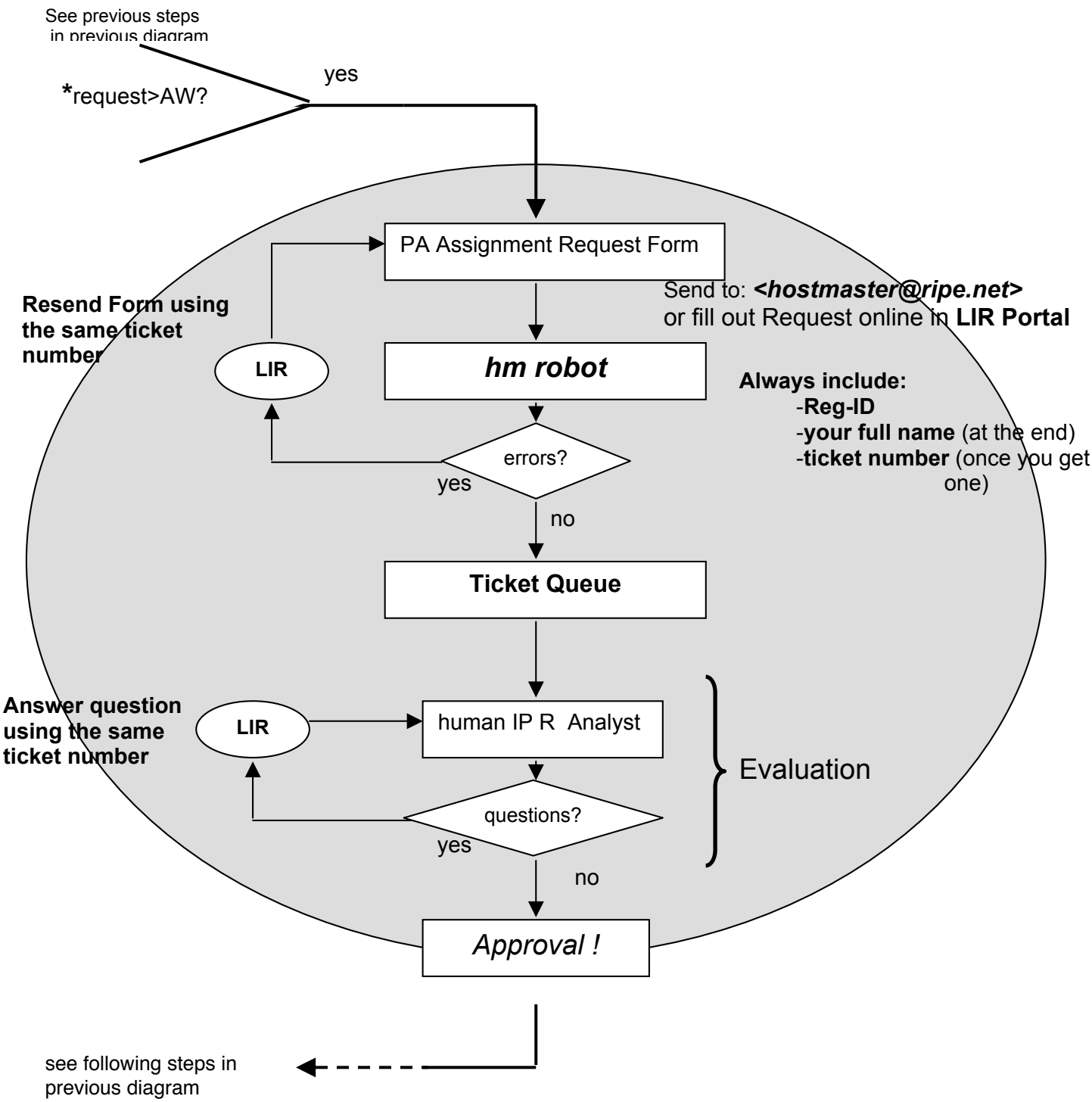


Fig. 4-2 *The Assignment Process: Communication between the LIR and the RIPE NCC. (Detail from the Previous Diagram)*

Request approval for an assignment either by:
-filling out the Request Form *[1] and sending it to ***hostmaster@ripe.net***
-or filling out the Request Form* online in the **LIR Portal** *[2]
-or use the '**PA Assignment Wizard**' *[3] in the LIR Portal

*[1] *See Section 4.3* *[2] *See Section 4.2* *[3] *See Section 9.5*

4.2 Communication with IP Resource Analysts

Registration Services Department (IP Resource Analysts) at the RIPE NCC deal with all requests for address space, among other issues. To facilitate efficient communication with LIRs, several procedures have been devised (how to distinguish between LIRs, how to ensure confidentiality, how to track and prioritise requests, etc.). These procedures are explained in detail in this section.

For sending requests the main point of contact with Registration Services is:

- the **LIR Portal**
- or the mailbox: ***hostmaster@ripe.net***

The **LIR Portal** allows secure access to confidential information about your LIR. The **LIR Portal** is the LIR's communication interface with the RIPE NCC.

https://lirportal.ripe.net/

(For more information see ***Section 9- LIR Portal***)
For questions -other than requests- there is a special mail-box reserved:
lir-help@ripe.net

The Ticketing System

The RIPE NCC uses a ticketing system that facilitates retrieval and archiving of incoming and outgoing messages. The ticketing system assigns a unique ticket number to each request as it is first received in either of these two mail boxes: ***hostmaster@ripe.net*** and ***lir-help@ripe.net.***

An acknowledgement containing this ticket number is automatically sent to the requester. This ticket number is quoted by the RIPE NCC in the subject line of each message referring to the request, and must be referenced by the LIR in all subsequent messages related to this request. The ticket number remains valid until the request has been completed. Every **new request** gets a **new ticket number**. An LIR should therefore never send two requests in the same message. Moreover, as a ticket number is associated with a specific request, it should never be re-used for another request. Never send a message about a particular request without quoting its ticket number,otherwise the system will assign it a new ticket number,and thus create a duplicate request.

The format of the ticket number is: NCC#YYYYMMnnnn (e.g. **NCC#2003073280**)

The status of any ticket can be looked up on

- **the LIR Portal**
- **or the following web page**: *http://www.ripe.net/cgi-bin/rttquery*

Status can be: OPEN-REG, OPEN-NCC and CLOSED.
OPEN-REG means that the RIPE NCC is waiting for a response from the LIR.
OPENNCC means that the LIR is waiting for a response from the RIPE NCC.

The tool also permits the LIR the use of labels in the ticket's messages: Any text in the Subject of a message between the opening delimiter: **#{** and the closing delimiter: **#}** is displayed next to that message.

Having a ticket number does NOT mean that the request is going to be seen by a human! If there are syntax errors, the Hostmaster Robot will return the request to the sender with an error report, and it will NOT be placed in the Ticket Queue.

The request will not be processed until the errors are fixed.

The Hostmaster Email Robot

Apart from issuing a ticket number, other automated actions will be performed by the Hostmaster Robot.The robot checks the syntax of requests, like verifying whether all necessary sections are there and if all mandatory fields are completed correctly.

As a reply, the LIR will receive an acknowledgement that the message has been received, with diagnostics of the request. If you are **re-sending** a request with corrections according to the error messages received, the same ticket number must be used in the subject line.

If you are correcting the **ERRORS** that the Hostmaster Robot has found please **re-send a new completed form** and do not just correct the errors in the Hostmaster Robot's message.

If the request does not contain no errors, the robot will forward it to the Ticket Queue.

(A human IP Resource Analyst will then pick up the request from the Ticket Queue and might still ask you questions. However when answering a Analyst's **QUESTIONS** you **do not have to resend a new completed form**.)

The robot will only send error reports a few times, after that it will give up and pass the request with the error report to the IP Resource Analyst. If you, the requester, do not understand any error, you can bypass the robot by including keyword **NOAUTO** in the Subject line of the e-mail.

Keyword ROBOTHELP can be included in the subject line for more help regarding how the robot functions.

Robot help page: *http://www.ripe.net/rs/status.html*
Robot source code*:* *ftp://ftp.ripe.net/tools/autohm.1.25.tar.gz*

Use the **LIR Portal** to edit the list of **registered LIR contact persons** for your LIR.

Only **registered LIR contact persons** may send assignment requests.

https://lirportal.ripe.net/ See also ***Section 9 – LIR Portal***

4.3 Completing the Request Form

As a first example we will look at the following scenario: An LIR requests IP addresses for the network of one of its End Users.

4.3.1 Gathering Information

> A separate "***PROVIDER AGGREGATABLE (PA) ASSIGNMENT REQUEST FORM"*** must be used for each End User

(Exception: IP addresses to be used purely for point-to-point connections between the LIR and the End User. These count as addresses for the LIR's infrastructure and can be included in the request form for the LIR
For a definition of what counts as an LIR's infrastructure see ***Section 7.7 - AW for the LIR's Own Infrastructure***.)

Information and documentation exchanged with the RIPE NCC must be in English.

> All the information is kept strictly confidential, apart from the **inetnum** and **person** objects in the RIPE Database.

Read "***QUICK TIPS FOR IP AND AS REQUESTS"*** provided by the RIPE NCC staff at:
http://www.ripe.net/info/hm-tips/

If you have any questions about completing the form, it is useful to look first in the collection of Frequently Asked Questions:
http://www.ripe.net/info/faq/

4.3.2 The Request Form

> The "***PROVIDER AGGREGATABLE (PA) ASSIGNMENT REQUEST FORM*** " can be found at:
>
> http://www.ripe.net/ripe/docs/iprequestform.html

The format of the form is explained in the RIPE document "***SUPPORTING NOTES FOR THE PROVIDER AGGREGATABLE (PA) ASSIGNMENT REQUEST FORM".***

> See ***Appendix 7*** for an example of a completed Request Form.

The ***"PROVIDER AGGREGATABLE (PA) ASSIGNMENT REQUEST FORM"*** is divided into 6 parts:

1. General Information Template
2. Address Space User Template
3. Addressing Plan Template
4. Equipment Description Template
5. Network Description Template
6. Network Diagram Template

We shall discuss in the following how to fill out these six templates in the request form.

> All field names in the request form followed by a colon (**:**) should not be changed. Otherwise the robot will not be able to process your request

1-General Information template

Here you only need to fill out the RegID of your LIR.
Please do not alter the pre-filled **'request-type'** and **'form-version'** fields

2-Address Space User template

Fill out information about the organisation that will use the requested addresses.

(If you are requesting the addresses for an End User, then fill out this template with information about that End User and not your LIR.
If the request is for the LIR's infrastructure, then fill in this template with information about the LIR.)

'**organisation-name**' is the name of the organisation that will use these addresses

'**organisation-location**' can be where the main office of the company is located. You can also mention the locations where the IPs will be used. Please include city and coutry.

'**website-if-available**'. If the End User has a website with information that could be helpful to understanding why public address space is needed, you can include that URL here.

Does the organisation already have address space that can meet the needs for this request? Enter "Yes" or "No".
space-available:
You should only send a request for address space that will be needed in the foreseeable future and for which the organisation does not currently have enough space available to cover.
If the organisation requesting the assignment does currently have address space that is not in use and could be used for this new assignment, please reply with Yes and give an explanation of why this new request is needed.

3-Addressing Plan template

number-of-subnets: this is the total number of subnets listed in the **#[ADDRESSING PLAN]#** template.

address-space-returned: If the user will be returning address space to another LIR after receiving this assignment, specify here the ranges that will be returned, to which LIR, and when. Note that the normally accepted time for renumbering is 3 months.
Use this syntax for this field: <x.x.x.x – x.x.x.x> to <name> by <yyyymmdd>
E.g. 195.20.42.0 – 195.20.42.127 to UpstreamISP by 20030725

After that you will fill out the most important part of the request form, the **Addressing Plan table** itself.

Before a request is submitted to the RIPE NCC, the LIR needs to gather information about the design of the network. Plans for future developments must be taken into consideration. The following questions are relevant:

- How many physical segments does the network consist of?

- What will each segment be used for?
- What equipment will be used?
- How many hosts are in each segment?
- What are the expectations of growth (within theassignment period , “Entire Period”)?

The answers to the questions above correspond to the appropriate fields for each physical subnet in the Addressing Plan table.

In the **Purpose** column, give a short but meaningful description of how the IPs being requested for each subnet that will be used. Vague descriptions should be avoided. If the whole description doesn’t fit in the space provided, a separate description can be attached or included in the **#[NETWORK DESCRIPTION]#** template.

Fill out the **Immediate Requirement**, **Intermediate Requirement**, **Entire Period** columns fields, with the number of IPs that are needed immediately and the estimated usage after half of the request period and for the entire assignment period. See table below for what these periods stand for.You can also fill out these fields in CIDR notation. They should be cumulative, showing the total number of addresses used in each period. They should show the actual amount of addresses needed based on concrete technical plans.
Include interfaces used for hosts, routers, gateways, terminal concentrators and other machines requiring one or more network interfaces.

Please note that as a result of implementing the ***RIPE Policy Proposal 2009-03***, also known as the ***’Run out Fairly Proposal’*** the Assignment Periods (Planning Periods) will get successively shorter over the course of 2010 and 2011.

	Immediate req.	Intermediate req.	Entire Period
1 Jan 2010	immediate	6 months	12 months
1 Jul 2010	immediate	6 months	9 months
1 Jan 2011	immediate	3 months	6 months
1 Jul 2011	immediate	2 months	3 months

The estimates you fill out in the Addressing Plan Template of the request form can be revised at a later point, so there is no need to make unrealistically large predictions just in order to be on the safe side.

In the **Size in CIDR** column, give the CIDR slash notation prefix corresponding to the total number of IPs needed for that subnet.
(Thus if the network or subnet needs a total of 128 IPs indicate this as /25).

See also Appendix F for the entire CIDR table.
You should not fill in the exact range of IP address you want to assign from your allocation, nor the amount of addresses in number format.

Please remember that the IP Resource Analysts have to understand the design of the network based on the information you provide in the Addressing Plan and the **#[NETWORK DESCRIPTION]#** template.

totals: Please fill in here the total of each column. The **amount in the total in the “Size in CIDR column”** should be the **total amount of address space being requested in this request**. (**in CIDR slash notation format)**. You can use several CIDR blocks if necessary: e.g. /24,/26,/27

The total fields of the **Immediate**, **Intermediate Requirement, Entire Requirement** columns can be in number format or in CIDR format.

Which netname will be used when registering this network in the RIPE Database?
Netname:

Fill in the netname that will be used for the **inetnum** object in the RIPE Database. Note that the netname RIPE NCC approves for this assignment must be the netname that is used in the corresponding database object. If it is not, the object will show as "invalid" to the RIPE NCC. If you change the netname after our approval, you will need to contact ***hostmaster@ripe.net*** so that the RIPE NCC records can be changed as well.

The netname should be a concise, descriptive name for the network and should somehow reflect the name of the ADDRESS SPACE USER. Valid characters are letters, numbers and dash.
Example:

```
#[ADDRESSING PLAN]#

number-of-subnets: 6
address-space-returned: 195.20.42.0 – 195.20.42.127 to UpstreamISP by 20030725

  As of 1 January 2010, assignments are for a period of up to 12 months
  As of 1 July 2010, assignments are for a period of up to 9 months
  As of 1 January 2011, assignments are for period of up to 6 months
  As of 1 July 2011, assignments are for a period of up to 3 months

       Size in CIDR   Immediate Intermediate Entire Period        Purpose
subnet        /25         120         120          120          dynamic dial-up Amsterdam (*1)
subnet        /25           0         120          120          dynamic dial-up Utrecht
subnet        /26          24          35           50          Amsterdam office LAN (*2)
subnet        /27           0          12           25          web/mail/ftp servers Utrecht
subnet        /27          10          12           19          web/mail/ftp servers Amsterdam
subnet        /28          14          14           14          training room LAN Amsterdam
totals   /24,/25,/28     168         313          348

Which   netname      will   be used when   registering this network in the RIPE Database?
netname: LAIKA-NET
```

This column only in CIDR (e.g. /25) format

These 3 columns either in CIDR (e.g. /25) or number (e.g. 128) format

Please note that as a result of implementing the ***RIPE Policy Proposal 2009-03***, also known as the ***'Run out Fairly Proposal'*** The Assignment Periods (Planning Periods) will get successively shorter

	Immediate req	Intermediate req	Entire Period
1 Jan 2010	immediate	6 months	12 months
1 Jul 2010	immediate	6 months	9 months
1 Jan 2011	immediate	3 months	6 months
1 Jul 2011	immediate	2 months	3 months

Always use the **same `netname`** for assignments to the **same End User**.
Always use the same **`netname`** to all assignments to your LIR's own infrastructure.

You should describe the purpose of the assignment in the **`description`** attribute of the **inetnum** object you will created for the assignment in the RIPE Database. (Not in the **`netname`** attribute)

4-Equipment Description template

It is not mandatory to fill out this template, however if you do not provide enough information for the IP Resource Analysts to understand the network in question and IP usage of the equipment, they will ask you further questions, hence delaying the approval of your request.

In this template please describe the equipment to be used in your network. Indicate the function of the equipment and provide information regarding the way it will use IP address space.
equipment-name:
Indicate the type of equipment requiring public IP addresses (Router,Switch, ATM, Workstation, etc)

manufacturer-name:
Indicate the vendor name of the equipment:

model-number:

other-data:
Please give any additional information that would clarify how this equipment or model uses IPs.
This might be the number of cards, ports, or network interfaces that the equipment has.
If the software used by the equipment requires multiple IPs, you can also describe that here.
You should repeat the **#[EQUIPMENT DESCRIPTION]#** template as many times as necessary to describe the equipment relating to the IPs being requested in the **#[ADDRESSING PLAN] #**.
Please mention here how many units will be used.

5-Network Description template

It is not mandatory to fill out this template, however if you do not provide enough information for the IP Resource Analysts to understand the network in question and IP usage of the equipment, they will ask you further questions, hence delaying the approval of your request.

If your description in the **#[ADDRESSING PLAN]#** does not allow the Analyst to understand the request, please add additional information that you think will facilitate the evaluation of the request. This template is a free-text space. If the Analyst requires additional information in order to understand the request, you may be asked more specific questions.

6-Network Diagram

It is not mandatory to include a Network Diagram, however if you do not provide enough information for the IP Resource Analysts to understand the network in question and IP usage of the equipment, they will ask you further questions, hence delaying approval of your request.

Please enter ‘Yes” if you have attached a network diagram in JPEG or PostScript format to this e-mail request.
A network diagram can be helpful in clarifying the set up of the network and illustrating why the IPs being requested are needed.

> **Note:** If you send the network diagram to RIPE NCC, you should include (on the diagram) the **Reg-ID**, the ticket number of the request and the name of the IP Resource Analyst name who is dealing with your request.

Additional Information

Any information that can facilitate the understanding of the request size should be added to the request, such as:

- deployment plan
- special purpose hardware/software

All this might be necessary to fully understand the network plan and how the network will be deployed. If this is already clear from the required documentation, no additional documentation is needed.

Signing the Request Form

Beneath the last line of the Request form the requester must put his/her signature:

```
...
#[END OF REQUEST]#
```

John Smith

> Requests without a signature or Reg ID will be rejected.

4.4 Conclusion

This section described the necessary documentation for a planned network before address space can be assigned, and how to communicate in the most efficient way with RIPE NCC IP Resource Analysts.

The next steps in the Assignment Process are described in ***Section 5 - Evaluation of Address Space Requests***, and ***Section 6 - Registering Address Space in the RIPE Database***.

References:

IPv4 Address Allocation and Assignment Policies in the RIPE NCC Service Region
http://www.ripe.net/ripe/docs/ipv4-policies.html

Provider Aggregatable (PA) Assignment Request Form
http://www.ripe.net/ripe/docs/iprequestform.html

Supporting Notes for the Provider Aggregatable (PA) Assignment Request Form
http://www.ripe.net/ripe/docs/iprequestsupport.html

Run out Fairly Proposal 2009-03
http://ripe.net/ripe/policies/proposals/2009-03.html

5. EVALUATION OF ADDRESS SPACE REQUESTS

In this chapter we shall discuss how the IP Resource Analysts will evaluate your PA assignment request.

Overview

RIPE NCC IP Resource Analysts evaluate each request separately, using criteria outlined in the RIPE document ***"IPv4 Address Allocation and Assignment Policies in the RIPE NCC Service Region".*** Where submitted information is insufficient or unclear, Analysts may ask additional questions.

In the following, we will discuss how the most important sections (templates) of the ***"Provider Aggregatable (PA) Assignment Request Form"*** will be evaluated by the Analysts.

5.1 Evaluation

First of all the IP Resource Analyst will check if the request is coming from the registered **LIR contact person**, (registered in the LIR's "reg file"). If not, the request will be marked as "not coming from the contact person", and the Analyst will ask the registered contact person for confirmation.

General Information

The Hostmaster Robot will check if the **x-ncc-regid** field is filled out correctly.

Address Space User

The human IP Resource Analysts will check if the **organisation-name** is filled out correctly. From the name filled out in this field it should be clear whether the addresses are requested for the LIR's own infrastructure or for an End User of the LIR.

Does the organisation already have address space that can meet the needs for this request? Enter "Yes" or "No".
Space-available:
How to fill out this field is discussed in ***Section 4.3 Completing the Request Form***.

Addressing Plan

- The **Purpose** column should provide a clear idea of how the addresses will be used in each subnet.
- By looking at the numbers filled out in the "Immediate Requirements", "Intermediate Requirements" and "Entire Period" columns, the Analyst can see how many addresses will be used and if this usage is efficient:
  1. 25% of the total address space requested is used immediately (within few weeks);
  2. 50% of the total space is used up halfway through the Entire Period

Please note that as a result of implementing the ***RIPE Policy Proposal 2009-03***, also known as the ***'Run out Fairly Proposal'*** the Assignment Periods (Planning Periods) will get successively shorter over the course of 2010 and 2011.

	Immediate req.	Intermediate req.	Entire Period
1 Jan 2010	immediate	6 months	12 months
1 Jul 2010	immediate	6 months	9 months
1 Jan 2011	immediate	3 months	6 months
1 Jul 2011	immediate	2 months	3 months

If efficient use is not shown, additional information with a concrete usage forecast may be requested. It is recommended to assign only the addresses for which utilisation can be shown and to request additional address space at a later date.

The Hostmaster Robot will also check if all the columns have been filled out in CIDR notation, if all subnets use classless notation. Any other notation will be rejected.

Motivation for 'No Reservations' Policy / Internal Routing and Reservation

LIRs can manage the address space allocated to them autonomously. However, it is recommended that LIRs do **not** reserve too much address space for each End User.

Why? If an End User comes back and, for example, requests more (or less) space than the amount reserved, the LIR will have gaps in its allocation. (Swiss cheese syndrome).
This will make it difficultfor the LIR to fill up 80% of the allocation with assignments in order to get an additional allocation from the RIPE NCC.

Private Address Space

The "***RFC 1918: ADDRESS ALLOCATION FOR PRIVATE INTERNETS"*** describes private address space and explains the ranges that have been set aside for Private Networks.
Private address space is recommended for large networks that will not connect to the Internet or where only a few hosts need to be connected. This type of address space saves public address space and offers flexibility.
Private address space should always be considered, It is often a viable option, specifically for large enterprise networks, where not all hosts need direct Internet connectivity.

Deployment Plan

A deployment plan may be needed when a big expansion or a large network from scratch is planned.

The plan should include:

- a list of events which will lead to the use of the requested addresses;
- the dates that the events will occur;
- description of equipment planned to be installed.

The deployment plan should be consistent with other information in the request (addressing plan, topology map).

RIPE NCC Requires Verification for "Always-On" Services

The RIPE Address Policy Working Group encourages its members to investigate and implement **dynamic IP address** assignment technologies whenever possible. **Static IP address** assignments are strongly discouraged (e.g. for broadband or for virtual web hosting). Special verification procedures apply when assigning static IP addresses,

The RIPE NCC requests LIRs to document and monitor their IP usage for so called "always-on" services. This is because requests of this kind are usually large and frequent. Once a /20 is in use and the LIR requests more IP addresses it is asked to show efficient usage of the address space over time.

It is recognised that where broadband services are provided, the static assignment of IP addresses (with or without the use of DHCP) for "always on" connections may sometimes be necessary. In other circumstances low user/IP ratios are used. The majority of home users are not online 24/7 for

example.
Close monitoring of the IP usage over time will indicate how often users are online and confirm the ratio of user/IP.

For more info (including examples) refer to:

http://www.ripe.net/rs/ipv4/ipv4-verification.html

For more info. please see the RIPE document ***"IPv4 Address Allocation and Assignment Policies in the RIPE NCC Service Region"*** at:

http://www.ripe.net/ripe/docs/ipv4-policies.html

This form of verification is flexible. We are not restricting LIRs on how they should verify their assignments. As long as it can be shown that the address space for "always-on" is being used efficiently, LIRs can choose whatever method is easiest for them.

Possible forms of verification include IP usage statistics generated by tools such as MRTG or RRDtool. Some LIRs have set up password protected web sites (only accessible from our network, 193.0.0.0 -
193.0.1.255) through which we can access the IP statistics.

It should be noted that bandwidth statistics do not show the IP usage, although they can be used as an additional indication of the growth of the service. Without additional statistics showing IP address usage or amount of customers that use the service, however, bandwidth statistics do not qualify as verification.

The **verification** should show the following :

- the IP capacity for each area

- the IP usage for each area
  (minimum/average/maximum on a daily/weekly/monthly basis)

All acronyms and text should be in English or be accompanied by an English translation.

Renumbering

A request for an exchange of addresses (renumbering) can be submitted, when an End User changes provider, or for a change from PI to PA addresses. As a result of renumbering, addresses will be returned either to the PA block of the former provider or the RIPE NCC address pool.
Just like with any other request, a renumbering request has to be submitted for approval only if the new request is above the new LIR's AW.

A renumbering request is made by completing the "***Provider Aggregatable (PA) Assignment Request Form".***

- The **#[ADDRESSING PLAN]#** template should contain information explaining how the new requested addresses will be used. (i.e the same purpose as previously)

If the user will be returning address space to another LIR after receiving this assignment, the **address-space-returned** field of the **#[ADDRESSING PLAN TEMPLATE]#** should be completed specifying all ranges of addresses to be returned, to which LIR and before what date by using the following format:

<x.x.x.x - x.x.x.x> to <ISPx> by <yyyymmdd>

E.g. 195.20.42.0 – 195.20.42.127 to UpstreamISP by 20030725

A period of 3 months should be sufficient for users to renumber their networks.

Renumbering Many End Users

Renumbering on a **1-to-1** (address) basis is simple. All networks renumbering on a 1-to-1 basis can be included in one ***"PROVIDER AGGREGATABLE (PA) ASSIGNMENT REQUEST FORM".*** However separate **addressing plans** should be listed for each End User.

The End User should contact the former LIR to inform them about the release of the addresses so that they can update their local records and the RIPE database accordingly.

Approval

> Please wait until you receive the **approval message** from the RIPE NCC before entering the objects in the RIPE Database and/or informing the End User (customer).
>
> (This avoids creating **invalid inetnum** object(s))

The approval message will read similar to the following:

Dear John,

RIPE NCC has approved the assignment of a /24 range of
256 addresses to the network GOODY2SHOES-1

**** What you must do now *****

1. Make an assignment from the address space allocated to nl.bluelight
2. Register the assignment in the database:
- use GOODY2SHOES-1 as the netname
- do not add the date to the changed line. The Database will add the date for you
- don't exceed 256 IPs in the range

http://www.ripe.net/info/faq/rs/main.html#8

3. Inform the customer of the assignment.
4. If you ever change the netname from GOODY2SHOES-1 to something else, you must inform <hostmaster@ripe.net>. Just reply to this message with details of the change.

Kind regards,
…

The message provides information about the

- prefix size,
- netname
- date

approved for your End User's network. The assignment (network) can only be identified by the **netname** (**GOODY2SHOES-1**).
The RIPE NCC keeps internal records of each request with an approval line which includes the **netname**.

The Approval Message only specifies the size of the assignment (+ date + netname).

It does not specify the actual IP address range.

The **LIR can choose any range** from its allocation, as long as the size is not larger than approved.

You can find a list of all approved assignments to your LIR in the **LIR Portal** under the menu: '**Resources' > 'IPv4'** .

5.2 Points to Consider for Your Internal Administration

- Following receipt of the Approval Message from the RIPE NCC, the LIR can choose the range it will assign to the End User from the LIR's allocation.

After receiving approval from the RIPE NCC, the LIR must **create an inetnum object** for the assignment in the RIPE Database. **Otherwise the assignment is not valid.**

- Please keep local records up-to-date. At this point, records will consist of all the messages exchanged between an LIR and the IP Resource Analysts at the RIPE NCC for each particular End User. Make sure to archive the approval message.
- Keep address assignments together with End User details. Also keep all documents relevant for this request. If you made an unusual decision or if you have any additional background information, keep it as it can be useful for future staff or the RIPE NCC.

All assignments must be **classless** and on a **bit boundary**.
An assignment is only valid for as long as the original criteria are valid.

End User Notification

At this stage the End User can be informed about the assignment. In order for an LIR and its End User to keep consistent information, the output of the database command should be sent to the End User.

With respect to assignments, the local records of an LIR should always be consistent with the records in the RIPE Database.

See ***Section 6 - Registering Address Space in the RIPE Database***

References:

IPv4 Address Allocation and Assignment Policies in the RIPE NCC Service Region
http://www.ripe.net/ripe/docs/ipv4-policies.html

Provider Aggregatable (PA) Assignment Request Form
http://www.ripe.net/ripe/docs/iprequestform.html

Supporting Notes for the Provider Aggregatable (PA) Assignment Request Form
http://www.ripe.net/ripe/docs/iprequestsupport.html

List of answers to frequently asked questions
http://www.ripe.net/info/faq/

List of short tips on how to complete the request form easier and faster
http://www.ripe.net/info/hm-tips/

RFC 2071: Network Renumbering Overview: Why would I want it and what is it anyway?
ftp://ftp.ripe.net/rfc/rfc2071.txt

RFC 2072: Router Renumbering Guide
ftp://ftp.ripe.net/rfc/rfc2072.txt

6. Registering Address Space in the RIPE Database

Overview

On receipt of the Approval Message from the RIPE NCC, the LIR must register the assignment in the RIPE Database. This is the LIR's and not the End User's responsibility.

If the assignment is **not registered** or **registered incorrectly** in the RIPE Database it is considered **invalid**.

Invalid assignments will cause delays in getting a new allocation or an AW raise and can result in audits.

Address space is considered "in use" only if registered in the RIPE Database. The RIPE Database, as a Public Network Management Database, serves in this way to provide contact information for troubleshooting; it also enables an overview of address space used in the RIPE NCC service region.

Creation of objects containing contact and authentication details is described in ***Section 2.4 .*** See also ***Section 10.2 -Protecting Database Objects.***

6.1 Creating Network (inetnum) Objects

The final step in the assignment process is to update the RIPE Database with **person** objects for all the contact people in the **inetnum** object and to create the **inetnum** object itself for the assignment.

NOTE: There are three possible methods to create or modify objects in the RIPE Database:
via the "e-mail interface": *[1] : ***auto-dbm@ripe.net***
using the "Webupdates" *[2] interface: ***http://www.ripe.net/webupdates***
or using "Syncupdates": ***http://www.ripe.net/db/syncupdates***

*[1] See ***Section 2.4.3 - Creating Objects in the RIPE Database Via the E-mail Interface***
*[2] See ***Section 2.4.1 - Creating Objects in the RIPE Database Using "Webupdates"***

If you create the **inetnum** object for the assignment via the e-mail interface, the template can be obtained using the "**-t**" flag in the command line of the database query:

```
$ whois -h whois.ripe.net -t inetnum
```

To create an **inetnum** object, the range of IP addresses that has been assigned to an End User must be filled in the `inetnum` attribute field.

The **tech-c,** and **admin-c** attributes of the **inetnum** object should have as values, **nic-hdl**s of **person** or **role** objects.

The **admin-c** (administrative contact person) for the assignment should be an employee of the organisation that will use the IP addresses. This person has the overall responsibility for the network.

The **tech-c** (technical contact person) for the assignment should have technical knowledge of the network. They can be employees of the organisation that will use the IP addresses, or employees of the LIR or a technical consultant. It is recommended to use role objects for your technical contacts.

The **status** attribute for the assigned address space should have the value **"ASSIGNED PA"**

The same **netname** should be used as approved by RIPE NCC IP Resource Analysts evaluating the "***PROVIDER AGGREGATABLE (PA) ASSIGNMENT REQUEST FORM***".

The date used in the **change:** attribute does ***not*** have to be the same as in the approval message from RIPE NCC, but rather the ***current*** date i.e. the date when you create the **inetnum** object.
If you have to submit an assignment for approval to the RIPE NCC, you may not create an **inetnum** object for the assignment until you receive the Approval Message. i**netnum** objects with dates prior to their Approval Message date are invalid.
(It is actually recommended to ***leave out the date completely*** because the Database software will add the current date).

LIRs should pay attention to the RPSL format of inetnum objects in the Database:

- **inetnum** value can be in dash notation (x.x.x.x. – y.y.y.y)
- **inetnum** value can also be in prefix notation (e.g x.x.x.x/23)
- Protection is mandatory - include **mnt-by** attribute
- Recommended: include **mnt-lower** and **mnt-routes**
- Line continuation (blank space or "+" sign)
- Attribute order is preserved
- Support for end of line comments
- No empty attributes allowed
- No empty lines allowed (would indicate a new object)
- No empty spaces to the left of attributes are allowed
- Submission to the DB supports:
  - MIME
  - PGP (GnuPG)

It is possible to use certain tools for converting address space representation from one format to another ("slash" notation, decimal, dotted quad etc). A Perl module is available on RIPE NCC ftp site:

ftp://ftp.ripe.net/tools/Net-IP-1.0.tar.gz

All end-user networks need to be registered separately, to avoid overlapping **inetnum** objects (Overlapping = two or more levels of the **inetnum** objects with the **status: ASSIGNED PA**)
By default, the RIPE Database will not prevent creation of overlapping **inetnum** objects, however overlapping **inetnum** objects are considered invalid by the Registration Services (IP Resource Analysts) of the RIPE NCC.

Registering an assignment: Example of an **inetnum** object for an assignment in the RIPE Database: (Based on the request shown in ***Section 4 – Requesting (PA) Address Space*** and ***Appendix 7***.)

ASSIGNMENT: to be created

```
inetnum:    80.35.80.0-80.35.81.143
netname:    LAIKA-NET
descr:      Laika Internet
country:    NL
admin-c:    AB231-RIPE
tech-c:     JJ125-RIPE
status:     ASSIGNED PA
mnt-by:     BLUELIGHT-MNT
mnt-lower:  BLUELIGHT-MNT
changed:    jan@bluelight.nl
source:     RIPE
```

To create this **inetnum** object, the authentication check of this maintainer must be passed

Do not include the date. The database robot will include the date.

When creating an **inetnum** object for an assignment, you have to pass the hierarchical protection (**`mnt-lower`**) of the parent **inetnum** object (e.g. the **allocation)** from which the **assignment** is made.

LIR'S ALLOCATION: already in the Database

```
inetnum:    80.35.64.0-80.35.95.255
netname:    NL-BLUELIGHT-20010723
descr:      BLUELIGHT INTERNET
country:    NL
org:        ORG-PIE-RIPE
admin-c:    ABC75-RIPE
tech-c:     XYZ13-RIPE
status:     ALLOCATED PA
mnt-by:     RIPE -NCC-HM-MNT
mnt-lower:  BLUELIGHT-MNT
mnt-routes: BLUELIGHT-MNT
mnt-domains: BLUELIGHT-MNT
changed:    jan@bluelight.nl
source:     RIPE
```

In order to create the assignment **inetnum** object above, the authentication check of this maintainer must also be passed

See ***Section 10.3 Hierarchical Authorisation*** and ***10.4.1 The Difference Between the mnt-lower and mnt-by Attributes***

Usually the same **mntner** is referenced in the **`mnt-by`** of the assignment and the **`mnt-lower`** of the allocation, therefore usually you only have to pass one authentication.

If creating the **inetnum** object via e-mail, include the following attribute at the bottom of the object:

```
password: cleartext_password
```

If the **mntner** has a PGP authentication, then sign only the object (not the whole e-mail) with the corresponding private PGP key.

See ***Section 10 .2 - Protecting Database Objects***

If you are creating the **inetnum** object via "Webupdates", then type in the clear text password in the [Authorisation] menu. You cannot use PGP signatures when using "Webupdates"

Since you can only type one password in the [Authorisation] menu, you cannot use it if you need to pass two **mntners**. In that case click the "Switch View" button in the [Add] menu and simply add two lines at the bottom of the object:

```
password: cleartext_password
password: other_cleartext_password
```

NOTE: **Difference between admin-c, tech-c and LIR contact persons**:

The **admin-c** and **tech-c** are contact persons of a specific network in whose **inetnum** object they are referenced in the RIPE Database. Their identity is public.

The **LIR contact person** is a registered contact person for an LIR. Only these people can request resources from the RIPE NCC on behalf of their LIR. They are registered in the "reg file" of their LIR kept by the RIPE NCC. Their identity is confidential, known only to the RIPE NCC and the LIR in question. LIR contact persons can be modified via the LIR Portal.

6.2 How to Manage the LIR's Allocated Address Space

The LIR should aggregate within its allocation in order to reduce the number of internal routes. This means that assignments to the same End User should be contiguous (next to each other). Also, take into account geographical locations of End Users when choosing the address ranges for their assignments.

To achieve all this, sensible internal reservations should be made within the allocation:
Keep some free space for some End Users to grow, thus avoiding fragmentation of the allocation. Do not make too large internal reservations and probably not for all of the End Users, since they might never need them. Making too large internal reservations could result in just the opposite of what you want to achieve. The allocation could become too fragmented, making it difficult to fulfill the criteria for an additional allocation i.e. filling up the allocation to 80% with assignments.

IP Address Management Tools :
Tools for managing LIR's allocated address space

"IP Address Management (IPAM) tools are increasingly important as new IPv6 networks are deployed with larger address pools, different subnetting techniques, and more complex 128-bit hexadecimal numbers which are not as easily human-readable as IPv4 addresses. IPv6 networking, mobile computing, and multihoming require more dynamic address management and are causing technical obsolescence of the early generations of IP address management (IPAM) software and spreadsheets used for address management" (from Wikipedia article)
RIPE NCC does not endorse nor guarantees the quality of any of the tools – they are listed only for your information.

Free

These tools are either Free Software, free of charge and / or Open Source.

Tools with IPv6 Support

IPAT (IP Allocation Tool)	http://nethead.de/index.php/ipat
NetDot	https://netdot.uoregon.edu/trac/
HaCi	http://sourceforge.net/projects/haci/
FreeIPdb	http://home.globalcrossing.net/~freeipdb/
Infoblox IPAM Freeware	http://www.infoblox.com/services/infoblox-ipam-freeware.cfm
IPv6 Subnet Calculator	http://www.ipv6book.ca/allocation.html
Brian McGehee IPv6 Address Utility	http://doc.tavian.com/ipv6util/index.htm

IPv4 only

These tools do not support IPv6 yet, but is in the list of planned features.

IPplan http://iptrack.sourceforge.net/

TIPP http://tipp.tobez.org/ & http://github.com/tobez/tipp

ON**A** (OpenNetAdmin) http://opennetadmin.com/

Commercial IP Address Management (IPAM) Tools with IPv6 support

In alphabetic order:

Alcatel-Lucent VitalQIP DNS/DHCP IP Management Software & Appliance
Bluecat Networks / Proteus Enterprise IPAM Appliance
BT Diamond IP - IPControl(TM) Sapphyre Appliances
BT Diamond – IPControl(TM) Software
Crypton UK - EasyIP(TM)
Incognito / Address Commander(TM)
Infoblox IPAM Express™ Solution
Internet Associates IPal
Men & Mice Suite: IPAM management module
Nixu NameSurfer Suite

Other related commerical products that also support IPv6:

EMC Ionix IPv6 Availability Manager
NetCracker (**Operational Support Systems** or **OSS**) tool
OPNET IT Guru (R) Network Planner

These lists are for information purposes only and are not necessarily complete.
The RIPE NCC is a neutral and impartial organisation and cannot recommend which tools to use. The RIPE NCC cannot guarantee the suitability of any of the tools listed.

Tools maintained by RIPE NCC:
http://www.ripe.net/tools/

At the RIPE 41 meeting (Amsterdam, January 2002) a new value for the **`status`**: attribute in the **inetnum** objects was introduced: **"LIR-PARTITIONED PA/PI"**. This new feature allows LIRs to delegate maintenance of different parts of their allocated space to, for example, different parts of their organisation, by introducing intermediate objects between allocation and assignment, and by using separate **`mnt-lower`** and **`mnt-routes`** attributes in these objects.

See ***Section 10.3 - Hierarchical Authorisation***.

The value of "**LIR-PARTITIONED PA/PI**" is allowed if one level less specific **inetnum** object contains a **`status:`** attribute with the value of "**ALLOCATED PA (PI)**" or "**LIR-PARTITIONED PA (PI)**".

This does not affect the responsibility LIRs have for allocations and assignments held by them. Furthermore, **inetnum** objects with the **`status:`** **LIR-PARTITIONED PA/PI** are not taken into account when calculating the utilisation level of an allocation.
(Remember? The utilisation level has to be 80% to get a new allocation)
Only **inetnum** objects with the **`status:`** **ASSIGNED PA** or **ASSIGNED PI** or **SUB-ALLOCATED PA** are taken into account for the utilisation level.

6.3 Registering an Assignment via the Database E-mail Interface

When submitting new object templates, completed templates should be sent via e-mail to:

auto-dbm@ripe.net

with the keyword **NEW** in the subject line. This is an automatic mailbox, handled by a robot. The syntax of the template will be automatically checked by the e-mail robot.
The e-mail robot then replies with a "**Summary of Update**" message stating:

- Number of objects found in the e-mail
- Number of objects processed **successfully**
- Number of objects processed with **errors**
- Object templates with errors clearly marked and explained at the appropriate attribute line.

The error reports are straightforward and identify the correction that has to be made.

> Note: Errors in the "Summary of Update" mean that the object was not registered in the Database and the template must be corrected and re-sent to ***auto-dbm@ripe.net***

If error reports continue and users are unable to locate the problem, the original e-mail and the "Summary of Update" error report should be sent by e-mail to:

ripe-dbm@ripe.net

This mailbox is maintained by a human. A reply will be sent explaining the error and help and support is provided.

See ***also Section 2.4.3 – Creating Objects in the RIPE Database via the E-mail interface.***

6.4 Registering an Assignment via "Webupdates"

See ***Section 2.4.1 - Creating Objects in the RIPE Database Using "Webupdates"***

6.5 More information

See ***Section 10 - Advanced Database Issues***. (Specifically the sub-section: ***10.1 Flags - Advanced Queries***.)
LIRs should consult the RIPE Database Documentation for more detailed information about creating objects in the RIPE Database.

6.6 Valid and Invalid Assignments

Invalid assignments and invalid Database objects **delay** the following procedures:

- AW raise
- Additional Allocation
- or may result in an audit procedure.

See ***Section 7 Assignment Window*** for more details on AW.

In order for an assignment to be considered valid by the RIPE NCC it must fulfill the following criteria:

We distinguish four cases:

WHEN ARE ASSIGNMENTS VALID?

If an assignment is for an End User and it's..

1. above LIR's AW:

It must be approved by the RIPE NCC and registered in the RIPE Database

- as one or more **inetnum** objects
- correct date (after approval date) *****
- total size and **`netname`** same as approved

2. within LIR's AW:

It must be registered in the RIPE Database

- with the **`netname`** pointing to the End User

If assignment is for LIR's own infrastructure and it's …

3. above LIR's AW:

It must be approved by the RIPE NCC and registered in the RIPE Database

- as one or more **inetnum** objects
- correct date (after approval date) *****
- total size and **`netname`** same as approved

4. within LIR's AW:

It must be registered in the RIPE Database

- with a separate line included in the **`inetnum`** object:

```
remarks: INFRA-AW
```

* If you do not include the date in the **changed**: attribute of **inetnum** object template, the Database robot will include the correct date.

6.7 RIPE Database Syntax vs RIPE Address Policy

Although strictly speaking they mean different things, the terms a 'Valid assignment' and a 'valid (**inetnum**) object (for an assignment)' are used interchangeably.

The **inetnum** object can only be valid if the corresponding assignment is valid and vice versa.

Please bear in mind that the syntax of the RIPE Database is much less restrictive than the RIPE Address policy. When you are creating an object in the RIPE Database the Database robot does not check if the object is valid according to the RIPE Address Policy.

The Database robot only checks if the format of the Database object is correct and if the necessary **mntner** authentication checks have been passed.

> Successful creation of an **inetnum** object in the RIPE Database is no guarantee that the object is valid according to the RIPE Address Policy Working Group policy.

Here are a few examples of **INVALID** **inetnum** objects that one would be able to create in the Database:

INVALID INETNUMS:

- Date in **changed:** attribute before approval date (never add the date in the **changed:** attribute to avoid this)
- Size above the LIR's AW but not approved by the RIPE NCC
  - AW is not checked by Database robot !
- Overlapping objects
- Assignments to several different End Users in one **inetnum** object
- Different **netname** than approved by the RIPE NCC

It is your responsibility as an LIR that not to create invalid objects in the RIPE Database.

6.8 Assignments to (Small) ISPs

What if one of your customers is not an End User but an ISP (Reseller) who has End Users as customers?

> Make sub-allocations! See ***Section–8 Sub-allocations*** .

Otherwise, if the LIR **does not qualify for** sub-allocations or does not want to make sub-allocations

- The ISP cannot make "sub-assignments" to the End Users.

- The LIR has to make separate assignments to
  - the ISP's infrastructure
  - to the ISP's customers
- Separate assignments must be
  - requested (if above AW)
  - registered in the RIPE Database

7. ASSIGNMENT WINDOW (AW)

Overview

The Assignment Window (AW) of an LIR is the maximum amount of addresses that the LIR can assign from its allocation without needing approval from the RIPE NCC.

The AW is used differently when making assignments to an ***End User*** as opposed to the ***LIR's own infrastructure***.

To End User: The AW determines the maximum amount of address space an LIR can assign **in 12 months** to **each** End User without needing approval from the RIPE NCC.

To LIR's own infrastructure: The LIR can make **as many** assignments to its own infrastructure **as needed** without needing approval from the RIPE NCC, as long as each individual assignment is not larger than the LIR's AW. (See ***Section 7.7***)

Sub-allocations to Resellers: The LIR's AW is also used to calculate the maximum address space a Reseller (which holds a sub-allocation from the LIR) can assign to each End User in any 12 months period. (See ***Section 8***)

7.1 Assignment Window Policy

A new LIR will always start with AW=0. Their AW will automatically be set to a /21 (2048 addresses) six months after receiving their first allocation.

In order to receive this AW raise to /21 the LIR should have no invalid assignments and assignment overlaps in the RIPE Database. All past assignments they made should be registered in the RIPE Database.

This means that all new LIRs need to request approval before making each assignment until their AW has been raised

There is no maximum AW. The AW is applied separately to each End User per 12 months

AW=0

If the AW is zero, every request needs to be sent to the RIPE NCC. For each request, a separate request form is needed.

You can find out the size of your LIR's AW, by logging on to the **LIR Portal** with a user account, and going to the '**Resources' > 'IPv4'** menu.

HOW TO AVOID COMMON MISTAKES WITH ASSIGNMENT WINDOWS:

IMPORTANT POINTS:

The **AW is not accumulative from one year to the next**.
If an LIR did not make any assignments to an End User within a 12 months period, they can still only make assignments up to the LIR's AW in the following 12 months period to that End User.

The **AW is per End User.**

The AW is the maximum amount of address space an LIR can assign to **each** of its End Users in any 12 month period without needing approval from RIPE NCC.

NOTE: The AW is **NOT "***the total amount of address space an LIR can assign to all of its End Users together in a 12 month period*"!
If an LIR has several End Users then it could assign its full AW to each End User in a 12 month period.

The **AW is per 12 months.**

For each End User the 12 month period starts when the LIR registers the End User's first assignment in the RIPE Database.

Assignments that were requested (sent in for approval) by the LIR from the RIPE NCC **are not counted** in the AW.

Example: If the LIR's AW = /22
The LIR can assign a /24 to an End User in May without having to request it from the RIPE NCC. **(/24<AW)**
The LIR can send in a request for a /22 for the same End User in June. ***(not counted in AW)***
The LIR can assign another /24 to the same End User in July without having to request it from the RIPE NCC.
(/24+/24<AW)

The assignments can be made in **one big chunk** or **several smaller chunks.**

Example: If the LIR's AW = /22
It can assign a /22 to an End User on the 13th November without having to send a request to RIPE NCC . After that until the following year's 13th November the LIR must send in all further requests for that End User to the RIPE NCC for evaluation.

OR:

It can assign a /24 to an End User on the 13th November
Then it assign another /24 to the same End User three weeks later
Then it can assign a /23 to the same End User in December.

} without having to send a request to the RIPE NCC

After that until the 13th November of the following year, the LIR must send in all further requests for that End User to the RIPE NCC for evaluation.

7.2 How to request an AW raise?

The initial raise of the LIR's AW to /21 is automatic if the criteria are met.. It does not have to be requested.

Criteria for raising the AW of an LIR:

- frequent PA requests to the RIPE NCC
- well documented requests
- correctly registered **inetnum** objects in the RIPE Database
- no unapproved assignments made above the LIR's current AW

A high AW naturally results in more responsibility for the LIR.

All further raises of the LIR's AW are not automatic. They rely on the RIPE NCC IP Resource Analysts to spot the increased experience of LIR staff. LIRs are encouraged to approach the RIPE NCC on this matter.

Write to ***lir-help@ripe.net*** if you think your AW should be raised.

7.3 When is an AW size lowered?

Every LIR is subject to auditing by RIPE NCC IP Resource Analysts on a regular basis in order to ensure fair distribution of address space. In some cases this might result in a lowering of the AW in order to correct possible Database inconsistencies or incorrect application of RIPE NCC policies. (See section ***17.1 - Audit***).
A request for an additional allocation can also result in lowering the AW if previous assignments are registered incorrectly in the RIPE Database.

7.4 Assignment Process to End Users

Within the AW:

If the "total size of this request and all assignments made to this End User within the last 12 month period (excluding assignment requested from the RIPE NCC)" is ***within the LIR's AW***, the LIR can make an assignment for that End User's network without sending the request to the RIPE NCC.

The following steps must be taken by the LIR (See ***Fig 7.1***):

1. A range of addresses from the LIR's allocation is chosen.
2. Local records are updated.
3. The **inetnum** is entered into the RIPE Database.
4. An acknowledgment is received from the Database.
5. The End User is informed of which addresses they have been assigned.

Above the AW:

If, however, the "total size of this request and all assignments made to this End User within the last 12 month period (excluding assignment requested from the RIPE NCC)" ***exceeds the LIR's AW***, then this request should be sent to the RIPE NCC IP Resource Analysts for evaluation and approval (see ***Section 4 Requesting (PA) Address Space*** and ***Section 5: Evaluation of Requests***).

After approval from the RIPE NCC, the same steps as above must be taken by the LIR (See ***Fig 7.2***):

1) A range of addresses from the LIR's allocation is chosen.
2) Local records are updated.
3) The **inetnum** is entered into the RIPE Database.
4) An acknowledgment is received from the Database.
5) The End User is informed of which addresses they have been assigned.

Q: How many IP addresses can I assign today to an End User without having to ask for approval?

A: Count back 12 months to find out!

i.e. Add up all the assignments to that End User within the last 12 months (excluding assignments approved by the RIPE NCC). (let's say the sum = x)
The number of additional IP addresses needed to reach your LIR's AW is the size of the assignment you can give them today without having to ask for approval. (AW-x)

7.5 Responsibilities of LIRs within their AW

LIRs have to evaluate all requests within their AW size, which includes: implementing all the polices in the policy document; making classless, conservative assignments; implementing dynamic solutions when possible; promoting DHCP, http1.1, dynamic dial-up; etc.

Further responsibilities include:

- Documenting assignments, since the RIPE NCC may ask for it at a later stage;
- Register all the assigned networks in RIPE DB with the appropriate **`netname;`**
- Reminding the End User's previous ISP to delete the outdated Database objects after renumbering.

THE ASSIGNMENT PROCESS TO END USERS (ASSIGNMENT WITHIN LIR'S AW):

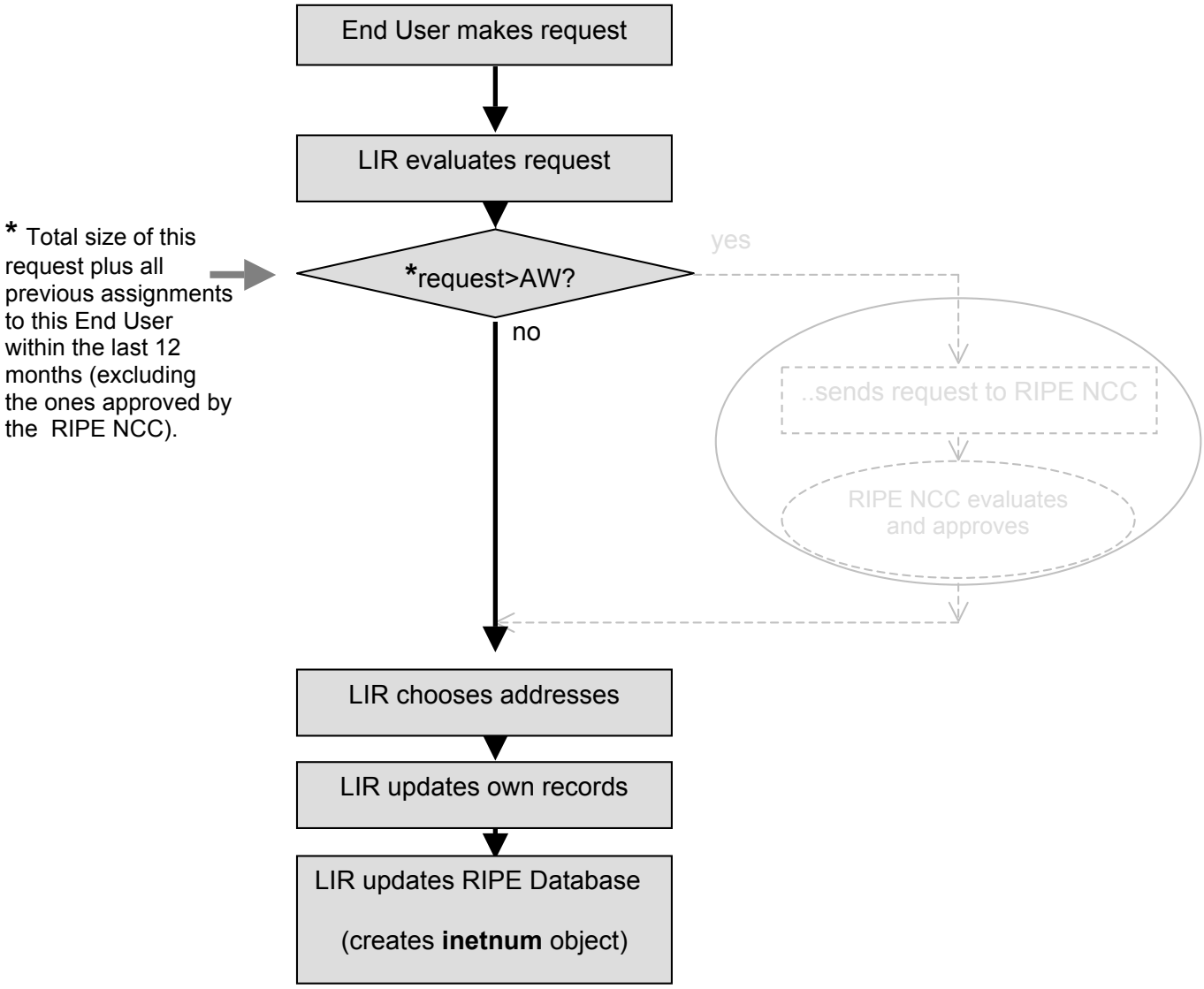

End User makes request
LIR evaluates request
* Total size of this request plus all previous assignments to this End User within the last 12 months (excluding the ones approved by the RIPE NCC).
*request>AW?
yes
no
..sends request to RIPE NCC
RIPE NCC evaluates and approves
LIR chooses addresses
LIR updates own records
LIR updates RIPE Database
(creates inetnum object)

Fig. 7-1** The Assignment Process **to End Users**: Assignment **within LIR's AW

THE ASSIGNMENT PROCESS TO END USERS (ASSIGNMENT ABOVE LIR'S AW):

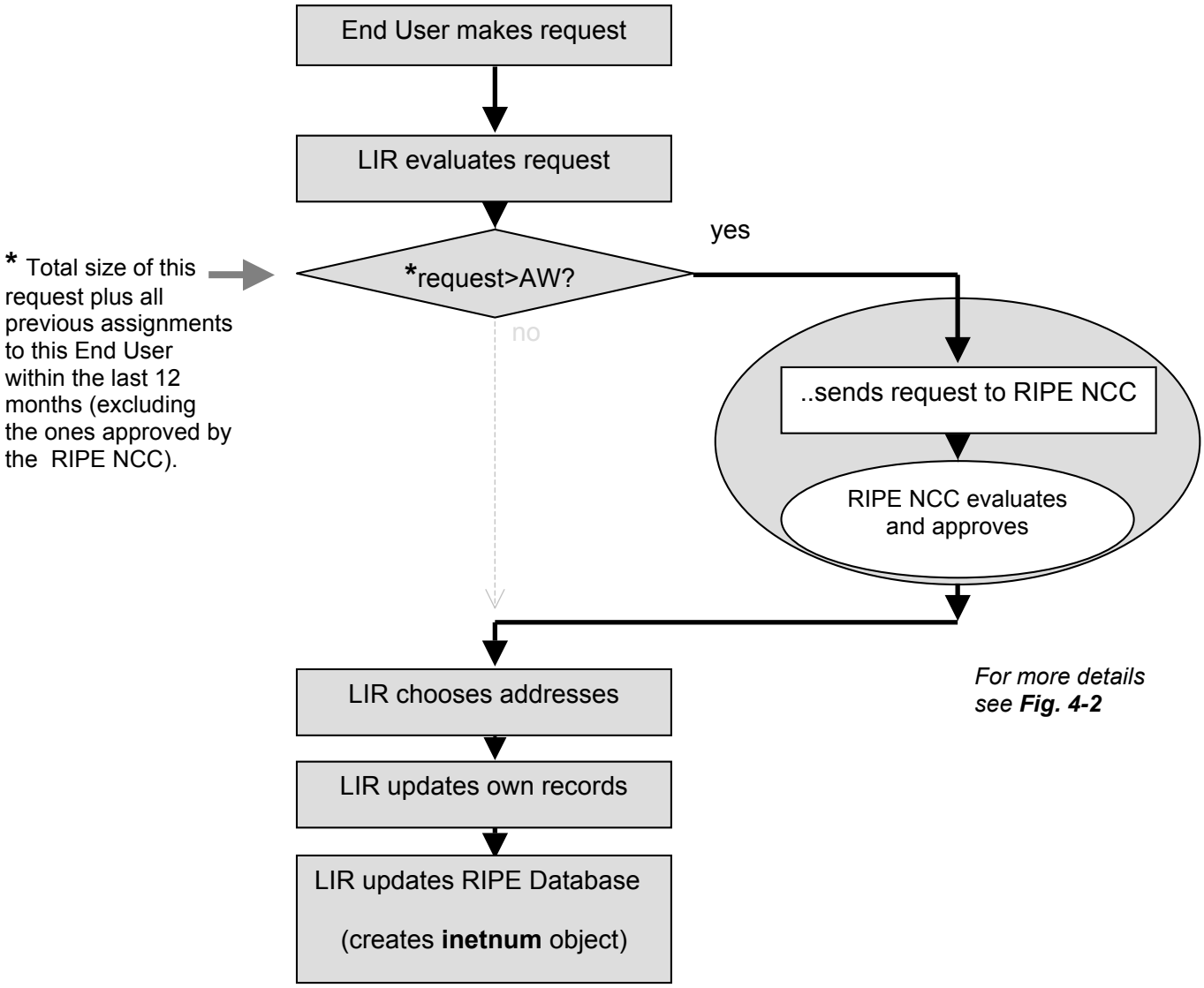

End User makes request
LIR evaluates request
*request>AW?
yes
no
* Total size of this request plus all previous assignments to this End User within the last 12 months (excluding the ones approved by the RIPE NCC).
..sends request to RIPE NCC
RIPE NCC evaluates and approves
For more details see Fig. 4-2
LIR chooses addresses
LIR updates own records
LIR updates RIPE Database
(creates inetnum object)

Fig. 7-2** The Assignment Process **to End Users**: Assignment **above LIR's AW

7.6 An Example of Using the LIR's AW When Making Assignments to an End User

Let us suppose the LIR **nl.animals** received an AW of /21 from the RIPE NCC.
This LIR has 3 End Users: **Redfox Ltd**, **Greenfish Ltd** and **Pinkcat Ltd.**

The End User **Redfox** wants an assignment of /21 on the 27th of April of 2003. ***(Fig 7-3)***
Redfox has not received any assignments in the last 12 months.

nl.animals may assign a /21 address space from its allocation to **Redfox** without asking for the RIPE NCC's approval.

Until the 27th of April 2004 **nl.animals** would have to ask approval for every additional assignment to **Redfox**.

On the 27th of April 2004 the 12 month period since the first assignment is over, so **nl.animals** can again assign the size of its full AW to **Redfox**.

Therefore it can make a /22 assignment to **Redfox** on the 22nd of August 2004 without having to fill out a request form asking for approval from the RIPE NCC .

In ***Fig. 7-3*** the timelines are horizontal. The **number of IP addresses that can be assigned** directly at any time (without needing approval from the RIPE NCC) is represented by the **height of the shaded area**.

LIR nl.animals : AW = /21

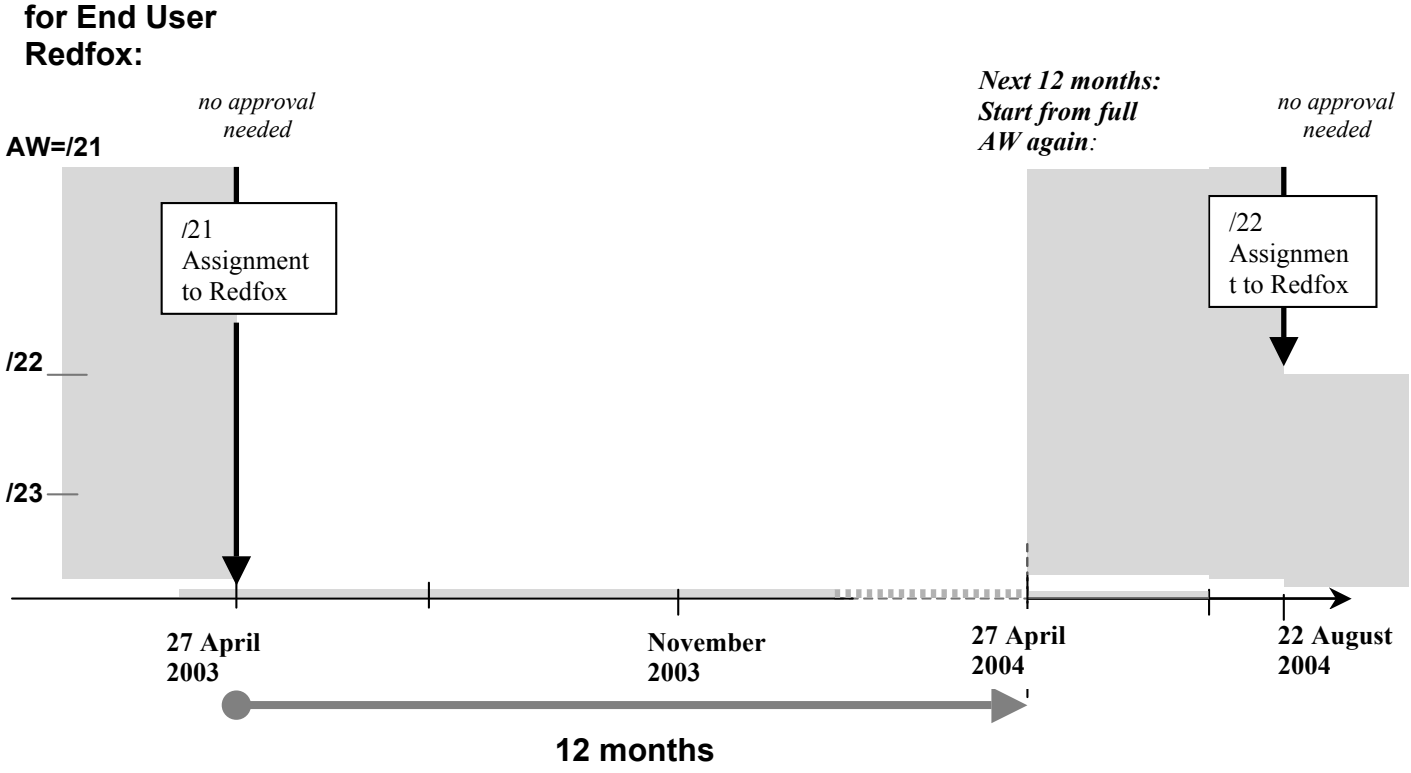


Fig. 7-3 *Using the AW for End Users (i)*

Now let's look at the two other End Users of the LIR **nl.animals**. (***Fig 7-4)***

In ***Fig. 7-4*** the timelines are horizontal. The **number of IP addresses that can be assigned** directly (without the RIPE NCC's approval) at any time is represented by the **height of the shaded area**.

The End User **Greenfish** requests an assignment of /22 on the 19th of April of 2003.
Greenfish has not requested addresses from **nl.animals** in the last 12 months.

nl.animals can assign /22 address space out of its allocation to **Greenfish** without having to ask for the RIPE NCC's approval.

If **Greenfish** requests another /22 assignment from **nl.animals** on the 6th of May 2003…

…then together with the previous request /22+/22 = /21 which is the size of **nl.animals**' AW.
Again **nl.animals** can make the assignment to **Greenfish** without having to ask for the RIPE NCC's approval.

If **Greenfish** requests another /22 assignment from **nl.animals** on the 8th of June 2003…

…then together with the two previous requests: /22+/22+/22 is above the size of **nl.animals**' AW.
For this third request **nl.animals** has to fill out a "***PA ASSIGNMENT REQUEST FORM"*** for **Greenfish** and send it to ***hostmaster@ripe.net*** for approval.

For the rest of the year (from the 6th of May 2003 until the 18th of April 2004 ,) **nl.animals** will have to request approval for every subsequent assignment to **Greenfish**.

Between the 19th of April 2004 and the 6th of May 2004 the first assignment is now older than 12 months, so it does not count anymore in the AW usage.

After the 6th of May 2004 the second assignment is also older than 12 months, so it does not count either. **nl.animals** can now again assign a total of /21 (its AW) to **Greenfish** without needing approval from the RIPE NCC.

If another End User, company **Pinkcat**, (who hasn't requested addresss space in the last 12 months) requests a /22 assignment in this period from **nl.animals** (e.g. on the 11th of June 2003), then **nl.animals** can assign a /22 address space to **Pinkcat** without having to request approval from the RIPE NCC.

i.e assignments to **Greenfish** don't use up the AW available to **Pinkcat** (or any other End User).

If **Pinkcats** wants a /21 assignment on the 4th of July 2003…
…then together with the previous request of /22, /22+/21 is above the size of **nl.animals**' AW.
nl.animals has to ask for approval from the RIPE NCC for this /21 assignment.

If **Pinkcats** wants a /23 assignment on the 12th of May 2004…
…then together with the previous request of /22, /22+/23 is less than **nl.animals**' AW.
Therefore **nl.animals** can assign the /23 address space to **Pinkcat** without having to ask for approval from the RIPE NCC.

Note that **assignments that have been requested from the RIPE NCC** (represented by dark grey boxes: eg /21 on 4th July 2003 for Pinkcat) are **not counted** when adding up all assignments made for a certain End User within the LIR's AW .

Fig. 7-4 illustrates the example on this page: how the LIR makes the decision whether or not to send in a request to the RIPE NCC, when an End User asks for an assignment

LIR nl.animals: AW = /21

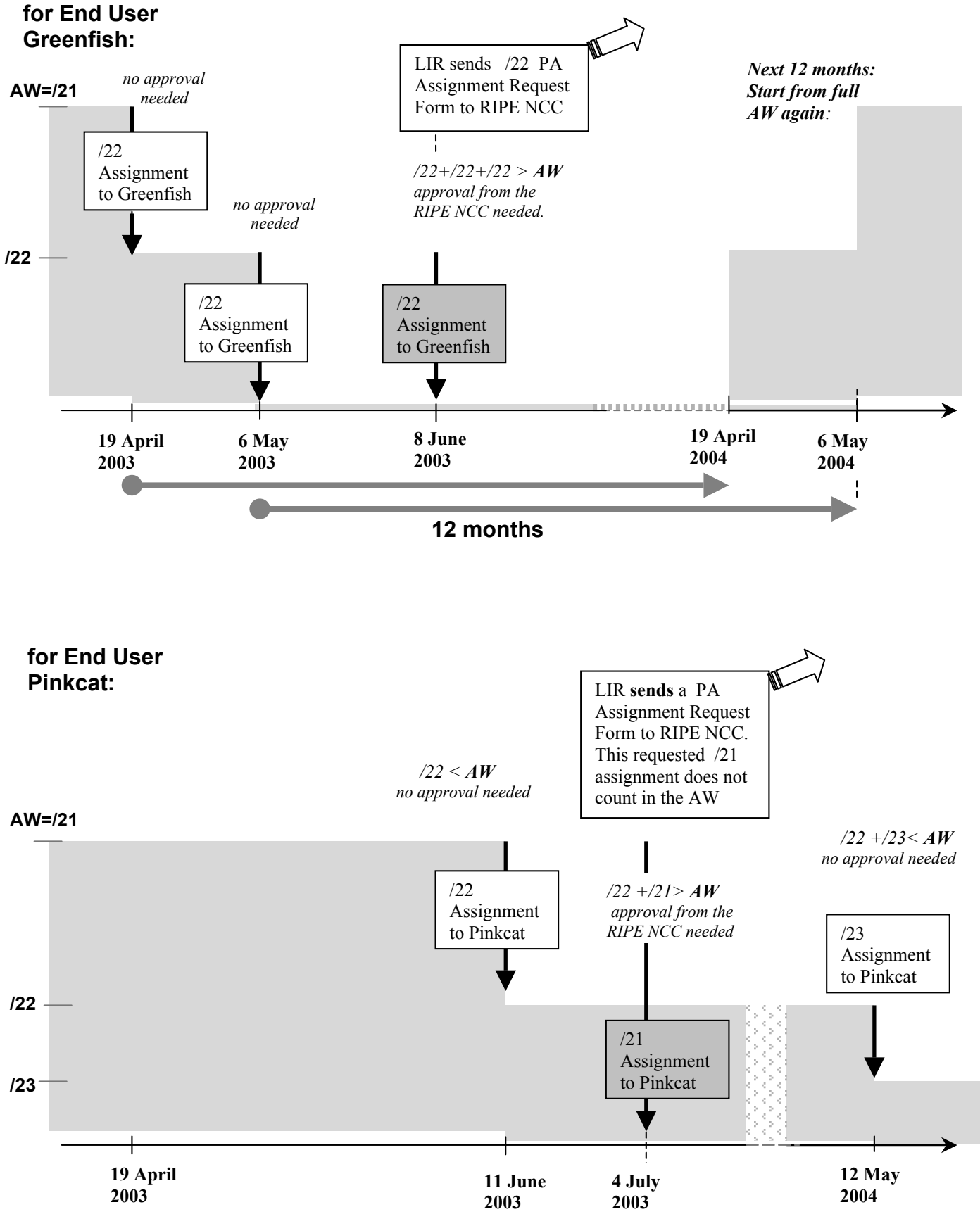


***Fig. 7-4** Using the AW for End Users (ii)*

7.7 AW for LIR's Own Infrastructure

Up till now in this chapter we discussed how the LIR's AW is used to make assignments to its End Users.

The AW is used differently when the LIR is making assignments to is own infrastructure.

What do we mean by the "LIR's own infrastructure" ?

- **LIR's internal network**
- **Connection to End Users**
  - but subnets managed by End Users do not count as LIR's infrastructure
  - (see FAQ at *http://www.ripe.net/info/faq/rs/main.html#3*)
- **Server hosting**
  - If administered by LIR

The LIR can make as many assignments to its own infrastructure as needed without having to request prior approval from the RIPE NCC, as long as each individual assignment is not larger than the LIR's AW.

Each assignment made to the LIR's own infrastructure using this policy must have a separate line in the "inetnum" object the RIPE Database:

`remarks: INFRA-AW`

It is important that a **separate** "remarks" attribute is used for this. No other comment may be included in this line. It is possible to have other "remarks" attributes in the same object.

Assignments with the **`remarks: INFRA-AW`** attribute cannot be merged in the RIPE Database!

Assignments to the LIR's own infrastructure that are larger than the LIR's AW still have to be requested from RIPE NCC.

DO NOT include the attribute: '**`remarks: INFRA-AW`**' in the **inetnum** objects for any assignments approved by the RIPE NCC, or else they will become invalid.

Therefore, all assignments to the LIR's infrastructure are either:

- Smaller or equal to the size of their AW and include the attribute: **`remarks: INFRA-AW`** in the **inetnum** object in the RIPE Database. An LIR can make as many of these as needed without having to request them.

- Larger than the LIR's AW. They **DO NOT** include the **`remarks: INFRA-AW`** attribute in the **inetnum** object. These assignments have to be requested.

The LIR therefore is much less restricted by the AW Policy when making assignments to its own infrastructure than when it is making assignments to one of its End Users.

This does not mean however that the LIR can make assignments to its own infrastructure without proper justification:

The RIPE NCC may request proper documentation and an overview of the address space used for the LIR's own infrastructure. If the LIR fails to show decent documentation the RIPE NCC may lower the LIR's AW.

THE ASSIGNMENT PROCESS FOR LIR'S OWN INFRASTRUCTURE (ASSIGNMENT WITHIN LIR'S AW) :

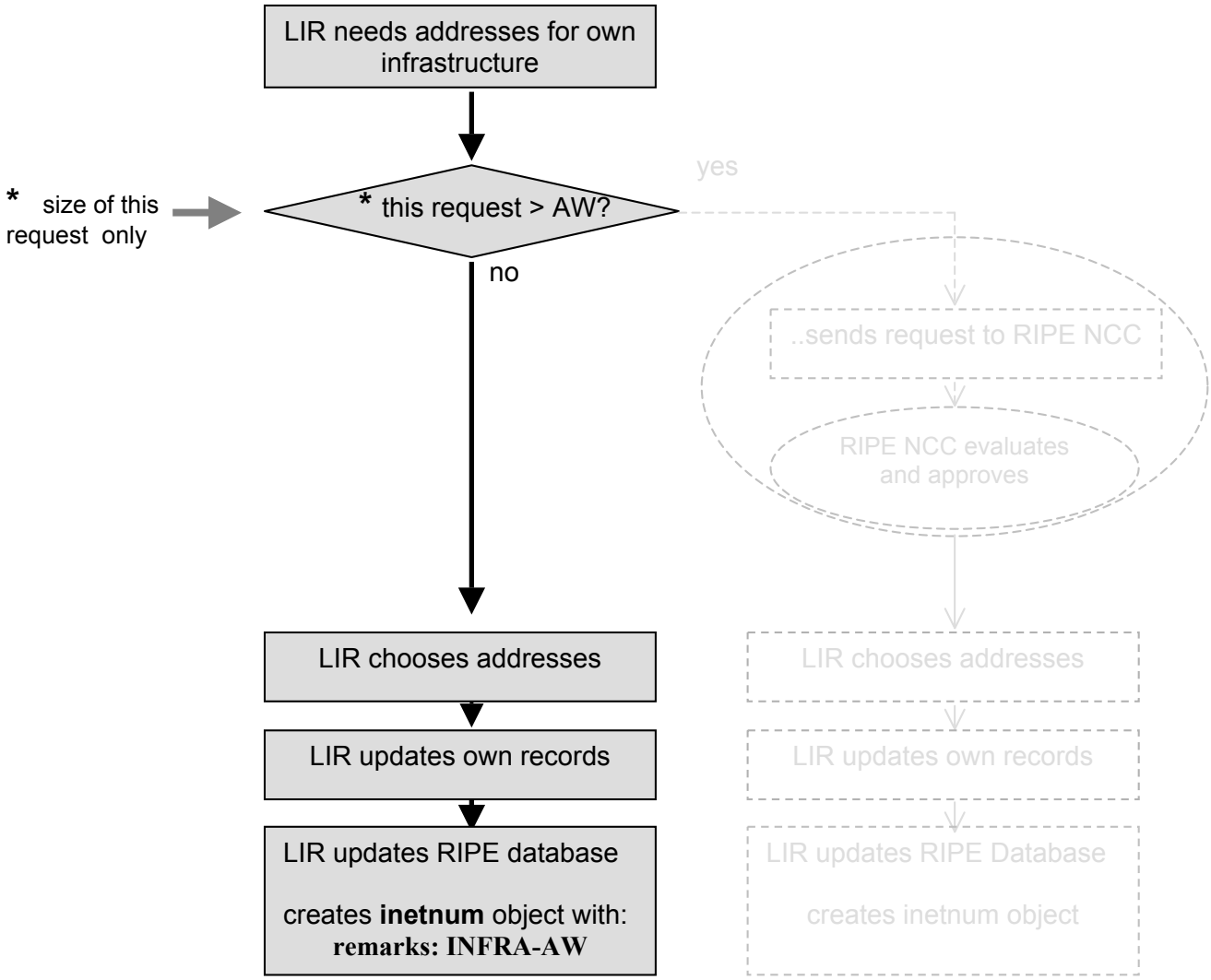


Fig. 7-5 *The Assignment Process* ***to LIR's own Infrastructure:*** *Assignment* ***within LIR's AW***

THE ASSIGNMENT PROCESS FOR LIR'S OWN INFRASTRUCTURE
(ASSIGNMENT ABOVE LIR'S AW):

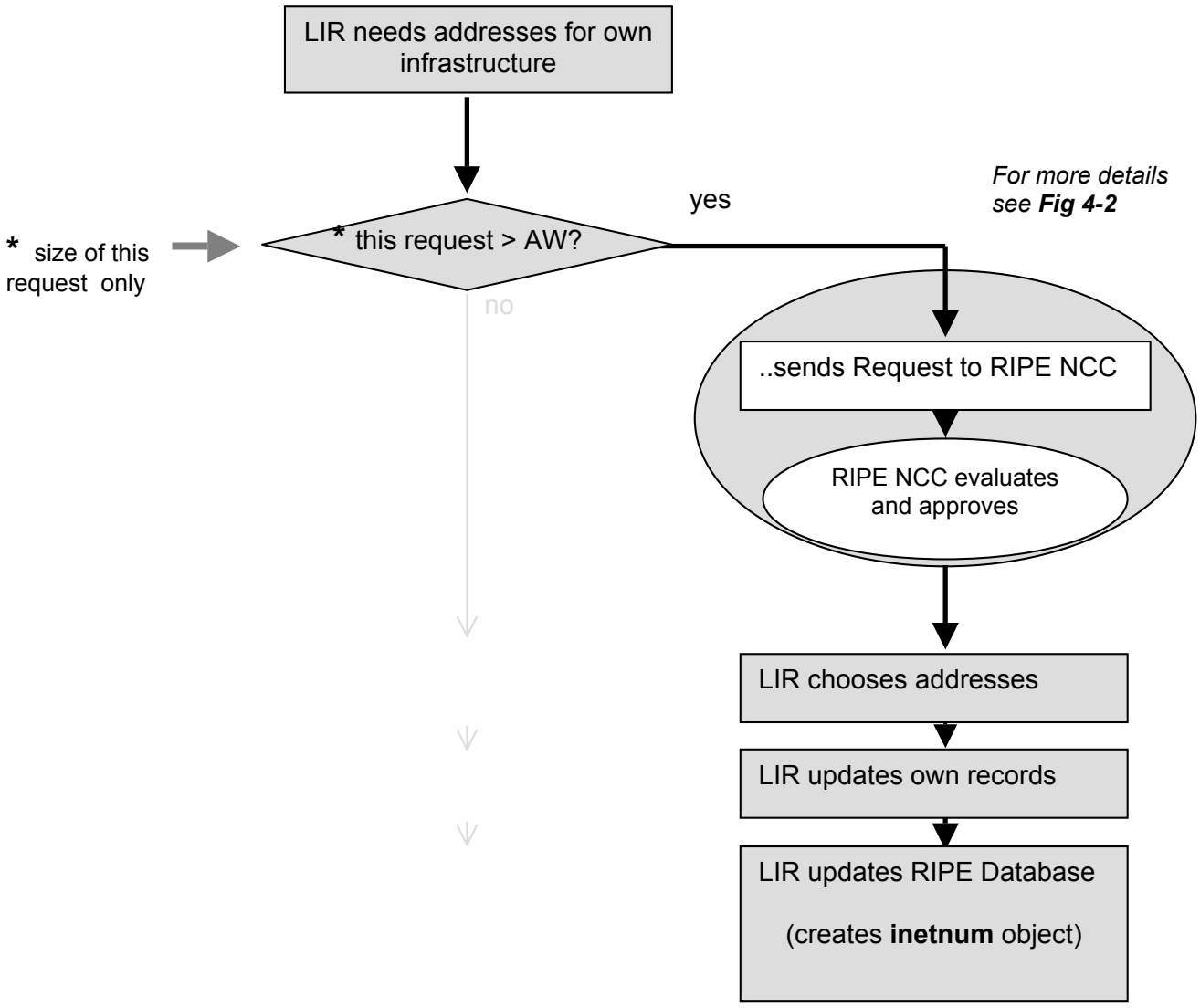

LIR needs addresses for own infrastructure
* this request > AW?
yes
no
* size of this request only
For more details see Fig 4-2
..sends Request to RIPE NCC
RIPE NCC evaluates and approves
LIR chooses addresses
LIR updates own records
LIR updates RIPE Database
(creates inetnum object)

Fig. 7-6 *The Assignment Process to LIR's own* ***Infrastructure:*** *Assignment above LIR's AW*

References:

IPv4 Address Allocation and Assignment Policies in the RIPE NCC Service Region
Section 7. Assignment Window
http://www.ripe.net/ripe/docs/ipv4-policies.html#aw

8. SUB-ALLOCATIONS

Overview

Since the end of October 2003 LIRs are authorised to make sub-allocations from their allocations to their Resellers.
The Resellers in turn can make assignments from these sub-allocations. All assignments from a sub-allocation are PA (Provider Aggregatable).

See ***SECTION 5.4 SUB-ALLOCATIONS*** in the RIPE document ***IPV4 ADDRESS ALLOCATION AND ASSIGNMENT POLICIES IN THE RIPE NCC SERVICE REGION.***

8.2 Making Sub-allocations

Sub-allocation: Address space from the LIR's allocation set apart by the LIR for the future use of a Reseller and its End Users. (LIR **>>>** Reseller)

The terms **"Allocation"** and **"Assignment"** are defined in ***Section 3.2 –Terminology***.
The term **"Assigment Window (AW)"** is defined and explained in ***Section 7. –Terminology.***

An LIR may sub-allocate up to a /20 to each of their customers in every 12 months.
No approval is needed from RIPE NCC for making these sub-allocations.

The minimum size of a sub-allocation is /24.

The maximum size of a sub-allocation is /20,.

The LIR must register every sub-allocation it makes in the RIPE Database.
The **inetnum** object created for a sub-allocation must have the status attribute filled out as:
`status:` SUB-ALLOCATED PA

LIRs have final responsibility for their sub-allocations, therefore they should only make sub-allocations to organisations they trust.

The LIR does not have to request sub-allocations from the RIPE NCC, but it can only make sub-allocations if it fulfils the requirements as explained above.

The LIR is advised to add the Reseller's **mntner** in the **`mnt-lower`** attribute of the sub-allocation in the RIPE Database. This will enable the Reseller to register assignments to End-Users in the Database.

Sub-allocations are considered as address space "in use" by the RIPE NCC. This is especially relevant when the LIR requests an additional allocation. (See ***Section 15 - Additional Allocation***)

8.2 Making Assignments from Sub-allocations

From their sub-allocation(s) the Resellers may make assignments to End Users or to their own infrastructure.

Each assignment must be registered in the RIPE Database with "**`status`: ASSIGNED PA**"

The AW rules also apply within sub-allocations:

- The Reseller can make as many assignments to its own infrastructure as needed without needing approval from the RIPE NCC, as long as each individual assignment is not larger than the LIR's AW.
  The **inetnum** objects created for these assignments must include the attribute:
  "**`remarks`: INFRA-AW**"

The LIR and/or the Reseller should archive all documentation for these assignments, as the RIPE NCC may ask for it at a later stage.

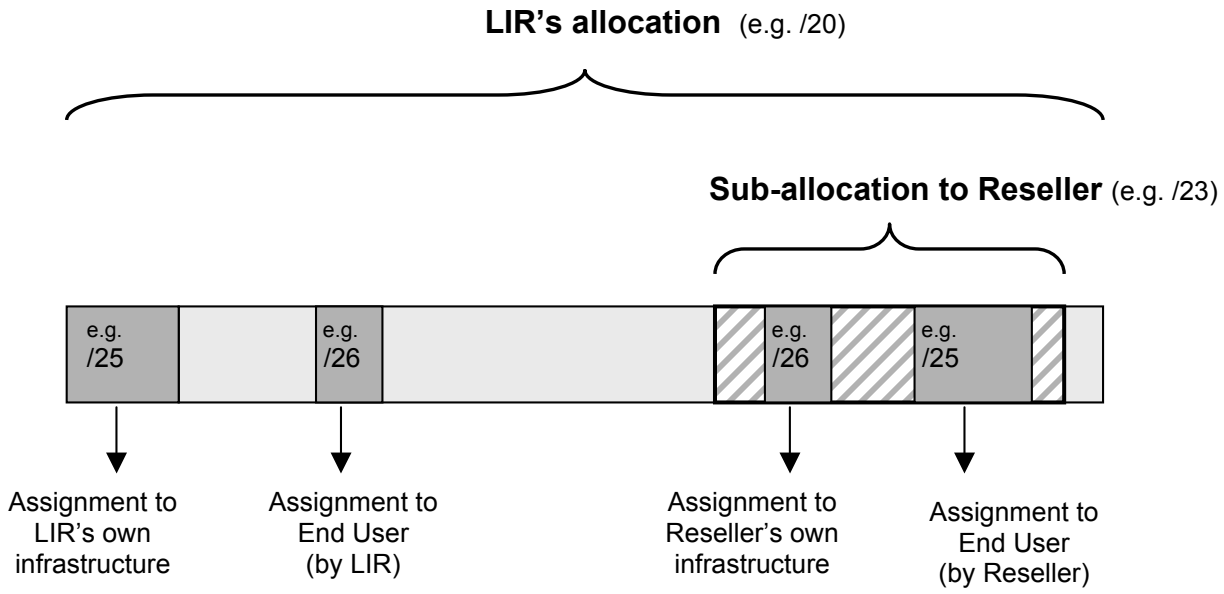


***Fig. 8-1** Allocation, Sub-allocations, Assignments*

References:

IPv4 Address Allocation and Assignment Policies in the RIPE NCC Service Region
Section 5.4 Sub-allocations
http://www.ripe.net/ripe/docs/ipv4-policies.html#sub_alloc

9. LIR PORTAL

Overview

The RIPE NCC LIR Portal provides users with secure access to confidential information about their LIR. It gives direct access to the RIPE NCC data.

The LIR Portal lets you update RIPE NCC's account information on your organisation ("reg file") directly, so that you don't have to go through the RIPE NCC IP Resource Analysts. Once a user is authenticated to the system, they will have secure access to the Portal's features.

LIRs can also request Internet Resources from the RIPE NCC online via the LIR Portal.

The LIR Portal is the LIR's main communication interface with the RIPE NCC.

RIPE NCC LIR Portal: *https://lirportal.ripe.net/*

9.1 How to Activate your Account

To activate your LIR's "admin" account for the RIPE NCC LIR Portal, please follow the procedure at the Account Activation Request Form *https://lirportal.ripe.net/lirportal/activation/activation_request*

(or click on the "Need new account?" link from the main LIR Portal page at *https://lirportal.ripe.net/*):

In the Account Activation Request Form fill out the following:

- The LIR must supply the RegID (unique Registry Identifier), name, job title, e-mail address and fax number of the LIR. They should also choose a password for the "admin" account. It is also necessary to supply the number of the last invoice sent to the LIR by the RIPE NCC.
- Once this information has been submitted via the form, the LIR will receive a fax with a "Fax Confirmation Number" on it and e-mail with an "E-mail Confirmation URL".
- At the URL in the "E-mail Confirmation URL" the LIR should supply the number given in the "Fax Confirmation Number". This activates the account. Once this has been done the LIR can log in, using the "admin" password they selected.

9.2 User Accounts: Viewing the Resources

Each LIR will receive an "admin" account with the password of their choice. This "admin" is able to create user accounts and set privileges for those accounts, enabling the users to view or edit resources listed in section ***9.3 Scope of the LIR Portal***.

NOTE: The "admin" account cannot view or edit any of the resources via the LIR Portal. Only "user" accounts can do that.

The user accounts of the LIR Portal are not identical to the "LIR contact persons". Log in as a user and create "LIR contact persons" in the "General Menu"

LIR Portal users who are contacts for more than one LIR can now be easily added to other LIR Portal accounts and can move between accounts without having to log out and log back in again using a different RegID.

9.3 Scope of the LIR Portal

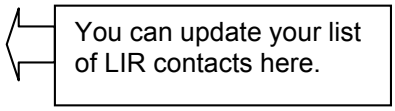
Features of the RIPE NCC LIR Portal include:

- **General menu:** read and edit LIR contact and address information
- **Billing menu:** read and edit billing information
- **LIR Contacts menu:** read and edit LIR contact persons information
- **Resources: IPv4 menu:** read only
- **Resources: IPv6 menu:** read only
- **Resources: ASN menu:** read only
- **Objects Editor menu:** read and edit your **allocation**, **mntner**, **organisation** objects in the RIPE Database
- **Request (Forms) menu:** requesting Internet resources on-line
- **Tickets menu:** read status of open tickets
- **Tools menu:** links to most important LIR tools
- **Change Password menu** change your user's password for the LIR Portal
- **X.509 PKI menu** create a certificate to use as access authentication for the LIR Portal

General menu:

READ ONLY:
- RegID
- Organisation name
- Type of LIR

READ AND EDITABLE:
- Community served by LIR
- Address
- Country code
- Remarks
- Telephone, fax and e-mail contact information
- LIR general e-mail addresses
- List of subscription addresses
- List of authorised contacts



Billing menu:

READ ONLY:
- Bill Debtor Number
- VAT number (only for LIRs from the European Union)
- E-mail protocol for invoices
- LIR billing reference
- Payment scheme
- LIR category
- Billing phase in case of late payments
- Payment history: date of invoices, amount due, paid/not paid

There is a direct link to the RIPE NCC Secure Registry Payment Form.

READ AND EDITABLE:
- Billing Address
- Billing e-mail

Resources: IPv4 menu:

READ ONLY:

- Assignment Window (AW) history:
  - Date
  - AW size
  - Ticket number and overview of e-mail messages, message bodies not shown

- Allocations to LIR:
  - Date.
  - IP-Prefix
  - **Inetnum** object in RIPE Database *(can be edited in the "Allocation Editor" menu)*
  - Ticket number and overview of e-mail messages, message bodies not shown

- PA Assignments approved by the RIPE NCC
  - Date
  - Size
  - Netname
  - **Inetnum** object in the RIPE Database
  - Ticket number and overview of e-mail messages, message bodies not shown

- PI assignments made by the RIPE NCC
  - Date
  - Range
  - **Inetnum** object in the RIPE Database
  - Ticket number and overview of e-mail messages, message bodies not shown

Resources: IPv6 menu:

READ ONLY:

- Allocations to LIR:
  - Date
  - Prefix
  - **Inet6num** object
  - Ticket number and overview of e-mail messages, message bodies not shown

Resources: ASN menu:

READ ONLY:

- Date
- AS Number
- **Aut-num** object in Routing Registry (RIPE Database)
- ASinuse lookup for appearance of the AS Number in global routing tables
- Organisation name
- Ticket number and overview of e-mail messages, message bodies not shown

Object Editor menu:

Allocation Editor sub-menu:

READ :

- Your LIR's allocation **inetnum** objects in the RIPE Database

READ AND EDITABLE:

Following attributes of your LIR's allocation **inetnum** objects in the RIPE Database:

- country

- admin-c
- tech-c
- remarks
- mnt-lower
- mnt-routes
- mnt-domains
- notify

Note: The LIR cannot modify their **allocation inetnum** objects directly in the RIPE Database. Only the above mentioned attributes of the allocations can be modified by the LIR and **only via the LIR Portal**.

Organisation Object Editor sub-menu:

READ :

- Your LIR's **organisation** object in the RIPE Database

READ AND EDITABLE:
Following attributes of your LIR's **organisation** object in the RIPE Database:

- country
- admin-c
- tech-c
- remarks
- mnt-lower
- mnt-routes
- mnt-domains
- notify
-

Note: The LIR cannot modify their **organisation** object directly in the RIPE Database. Only the above mentioned attributes of the **organisation** object can be modified by the LIR and **only via the LIR Portal**.

Mntner Object Editor sub-menu:

Here you can create your **mntner** object. Due to change in procedures, **mntners** now can also be created directly in the RIPE DB so this sub-menu is redundant.

Request (Forms) menu:

The following Request Forms are available as CGIs under this menu:

- IPv4 First Allocation Request Form
- Provider Aggregatable (PA) Assignment Request Form
- IPv4 Additional Allocation Request Form
- Provider Independent (PI) Request Form
- AS Number Request Form
- IPv6 First Allocation Request Form
- IPv6 End User Site Assignment Request Form in the RIPE NCC Service Region
- IPv6 Internet Exchange Points Assignment Request Form

These Request Forms are multi-stage CGIs. When an LIR completes a form they can click a "submit" button and have the form turned into a request ticket straight away.
Partially completed request forms can be saved and completed at a later date.

- PA Assignment Wizard (see ***Section 9.5 'PA Assignment Wizard'***)

Tickets menu:

READ ONLY:

- Open Tickets:
  - Ticket number and overview of e-mail messages, message bodies not shown
  - Status
  - Category
  - Date opened
  - Date Last Closed

Tools menu:

Links to LIR tools to manage your resources and communications with the RIPE NCC:

- RIPE Meeting Registration
- Whois Queries
- Bill Payment
- Ticket information and Status
- IP Count
- Password Encryption (for **mntners**)
- RIS Queries (AS/IP)
- Training Courses (timetable and registration)
- Syntax Checkers (IP/AS)

X.509 PKI menu:

- Generate certificates (with the option of automatically creating a **key-cert** object in the RIPE Database
- Replace certificates
- Revoke certificates
- Add authentication to **mntners**
- Root Authority

You can also Consult the PKI FAQ from this menu.

For more information about X.509 PKI please refer below to ***Section 9.4 - X.509 PKI: Improved Secure Communication System for RIPE NCC Members***

You can click on the **"i"** icons in the LIR Portal to have each of these terms explained further.

NOTE: Resources that have not been requested from the RIPE NCC are not listed in the LIR Portal. (e.g. assignments within the LIR's AW or AS Numbers assigned to the organisation before it became an LIR)

News: RIPE NCC and Internet registries related announcements.
Events: RIPE and RIR meetings and RIPE NCC Training Courses.
Glossary: Definition of terms in the LIR Portal.
Contact: RIPE NCC contact information (mailboxes)

9.4 X.509 PKI: Improved Secure Communication System for RIPE NCC Members

X.509 PKI stands for X.509 Public Key Infrastructure

For each LIR a PKI certificate with administrative powers will be issued. The LIR Portal Administrator ("admin account") can request such a certificate after authenticating (using username and password)

on the LIR Portal. With that certificate an LIR can issue (and revoke) certificates to its own users with varying permissions per users.

> As well as using an LIR/username identifier and password it is possible to log in to the LIR Portal using client-side PKI certificates.

X.509 can be used for secure communication with following RIPE NCC Services:

Registration Services
Billing

For more information please see the draft document "***IMPROVED SECURE COMMUNICATION SYSTEM FOR RIPE NCC MEMBERS"*** at the following URL:
http://www.ripe.net/ripe/draft-documents/archive/pki-20030429.html

9.5 Feedback and Improvement

Please send feedback and suggestions about the LIR Portal to: ***lirportal-feedback@ripe.net***
There is also a mailing list ***lirportal@ripe.net*** to which you can register at:

http://www.ripe.net/mailman/

YOU SHOULD NOW:

- **activate the "admin" account for your LIR**
- **create user(s)**
- **check out all the features**
- **use the LIR Portal for changing contact info or viewing resources**
- **use the LIR Portal for requesting Internet Resources online**

- **request a X.509 PKI certificate with administrative powers**
- **issue certificates to users**

10. ADVANCED DATABASE ISSUES

Overview

The most important topics in this chapter are:
- Advanced Queries using flags
- Protection of objects and hierarchical authorisation
- RIPE Test Database

> For an introduction to the RIPE Database, creating objects and querying see ***Section 2 - Basic RIPE Database Issues.***

10.1 Flags – Advanced Queries

All the flags which can be used for the database are described in the document ***RIPE DATABASE REFERENCE MANUAL,*** **Chapter 2:** ***Queries in the RIPE Database*****.** There is also a good overview in the ***RIPE DATABASE QUERIES REFERENCE CARD.***

Default query for the address range can be performed either by submitting IP address, IP range or the **netname** in the **whois** query. It will return either the exact match for the submitted address range, or the smallest address range that is larger than the specified range and contains the submitted address range.

$ whois -h test-whois.ripe.net 195.35.80.0/25

$ whois -h test-whois.ripe.net GOODY2SHOES-1

The '**-r'** flag will turn off recursive lookups. Recursive lookups of referenced contact person objects is the default selection.

If the exact match is not found, the default lookup will return the least specific object found. To force the database to return an exact match, the '**-x'** flag can be used. If no matching object is found, nothing is returned. This flag is useful for scripts querying the RIPE Database to make sure they only produce defined results.

Hierarchical lookups

There are several flags which enable you to find more or less specific address blocks in the RIPE Database:

The **'-m'** flag allows the user to look up all those objects which are one level more specific (i.e. smaller) than the range you have given in your query. In the case of **inetnum** objects, this means that you can look up all those **inetnum** objects which are the "children" of the **inetnum** object.

> You can query an allocation using the '–**m'** flag and get all the assignments within the allocation:
>
> $ **whois -h test-whois.ripe.net -m - 80.35.64.0/19**

The '**-M'** flag will give as an output **all** of the more specific objects, that are contained in the specified range, not only children objects but " children of children" and so on.

The '**-l**' flag shows one level less specific (i.e. parent object) objects, and it does **not** return the exact match. It returns the smallest IP range that is bigger than the supplied range and that fully contains it.

The '**-L**' flag can be used to locate the LIR that has made the assignment(s) to the End User. It shows the "next objects up" in the hierarchy (i.e. all less specific matches). In this case the LIR's allocation:

-- whois -h whois.ripe.net -L [End User's IP range]

Inverse lookups

When you perform an inverse lookup you are looking for all objects in which a certain object or attribute is referenced.

whois –i {attribute} {value}

Inverse queries can be used to find all objects in which a certain person object is referenced as the technical contact tech-c:

whois –i tech-c AB7-RIPE

e.g. To find all objects in which a certain **person** object (e.g. JA5-RIPE) is referenced :

whois –i pn JA5-RIPE

e.g. To find all objects that are protected by a certain **mntner** object (e.g. MY_MNTNER-3) :

whois –i mnt-by MY-MTNER-3

Inverse queries cannot be performed on every attribute of every object in the database. Refer to ***Appendix 6*** for a list of object templates. The inverse lookup keys on which inverse lookups can be performed are marked for each object template.
It is possible to use the **i** flag to perform inverse lookups for these attributes belonging to diverse objects:

-i admin-c <nic_hdl l name>
-i tech-c <nic_hdl l name>
-i zone-c <nic_hdl l name>
-i author <nic_hdl l name>
-i cross-nfy <nic_hdl l name>
-i pn <nic_hdl l name>
(= -i ac,tc,zc,ah,cn)
-i notify <e-mail>
-i upd-to <e-mail>
-I auth <specific auth attribute value> e.g.: PGPKEY-00D69859 (only for PGP and X.509)
-i mnt-nfy <e-mail>
-i mnt-by <maintainer name>
-i mnt-lower <maintainer name>
-i mbrs-by-ref <maintainer name>
-i mnt-routes <maintainer name>
-i cross-mnt <maintainer name>
-i referral-by <maintainer name>
-I auth <method> <value>
-i org <organisation ID>
-i origin <AS>

-i local-as <AS>
-i member-of <set name>
-i nserver <hostname I IP address>
-i sub-dom <domain name>
-I abuse-mailbox <person,role,ornanisation,mnter or irt>

10.2 Protecting Database Objects

NOTE: mntner objects protect other objects in the RIPE database.

Objects in the RIPE Database are protected by using the **`mnt-by`** attribute. The value of the **`mnt-by`** attribute is the name of the **mntner** object that will protect the object. It is mandatory to include a **`mnt-by`** attribute in every Database object.

Maintainer (mntner) Object

Every time a Database object with a **`mnt-by`** attribute is created, updated or deleted the **mntner object** referenced in that attribute is "consulted" to determine whether or not the authentication (password, PGP signature etc) supplied with the update request is correct.

More specifically the **`auth`** attribute of the **mntner** object is "consulted" to check if the authentication supplied with the update matches the authentication in the **`auth`** attribute. Only if the correct authentication is supplied will the object be updated.

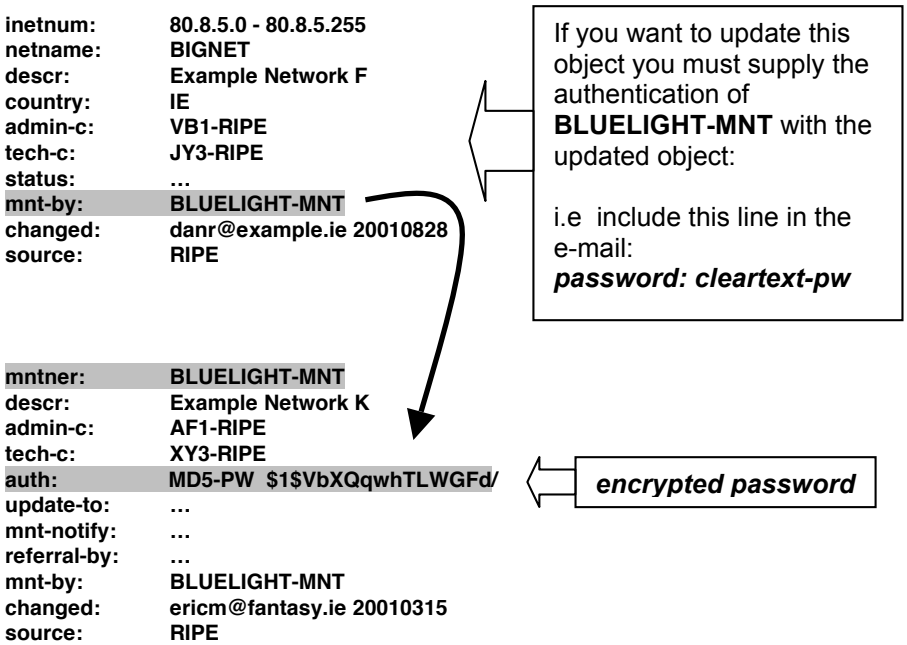


***Fig. 10-1** An **inetnum** object protected by a **mntner** object*

If you update an object via the e-mail interface, the authentication has to be included in the e-mail message. If you use “Webupdates” for making updates the authentication has to be entered in the **[Authorisation]** menu before making the update.

Each **mntner** object should have a unique name. **mntner** objects can be created just like any objects using any of the interfaces (“Webupdates”, “Syncupdates” or email) of the RIPE Database.

mntner objects also contain information on contact persons and on and notification details. Therefore **mntner** objects can also be used to notify you of any changes to your objects.
See also ***Section 2.4.2 Creation of mntner Objects***

Example of a mntner object:

```
mntner:     BLUELIGHT-MNT
descr:      Maintainer for all Bluelight objects
admin-c:    JJ231-RIPE
tech-c:     BL112-RIPE
auth:       MD5-PW  $1$VbXQqwhTLWGFd/
upd-to:     jan@bluelight.nl
mnt-nfy:    auto-mnt@bluelight.nl
referral-by:  RIPE-DBM-MNT
mnt-by:     BLUELIGHT-MNT
changed:    hostmaster@bluelight.nl  20010501
source:     RIPE
```

This **mntner** object above protects every object in the RIPE NCC Database that includes the attribute:

`mnt-by:` BLUELIGHT-MNT

Therefore BLUELIGHT-MNT **mntner** object protects itself as well, since it includes a **`mnt-by`** attribute line referring to itself.

`upd-to` attribute references the e-mail address which will be notified of all ***failed*** attempts to modify any object that is protected by the **mntner** object.
`mnt-nfy` attribute references the e-mail address which will receive notifications of all successful updates.
`referral-by` attribute is mandatory in **mntner** objects. It references the **mntner** object that created this object. For all **mntner** objects in the RIPE Database the value is: **RIPE-DBM-MNT**.

Authorisation Schemes

The authorisation model supports multiple authentication schemes.
The **`auth`** attribute specifies which scheme will be used authenticate update requests for objects protected by the maintainer.

See also: *http://www.ripe.net/db/support/security*
for more information on data protection and authentication schemes.

- **NONE, MAIL-FROM, CRYPT-PW** These authentication methods are deprecated.and cannot be used anymore!

- **Password (MD5-PW)**

  This scheme uses an MD5 hash (using the FreeBSD crypt_md5 algorithm). The main benefit over CRYPT-PW is that pass phrases longer than 8 characters may be used.

  The clear-text password is chosen by the user; this is then encrypted (using the methods listed below) and stored in the Database in its encrypted form.

  - ***EMAIL***: When sending in update requests via e-mail to ***auto-dbm@ripe.net,*** the clear-text password has to be provided in the message body by specifying:
    password: *cleartext-password*
    at the beginning of a line and preceding any update requests to be authenticated (the encryption is repeated and the results are compared). The password will remain effective for all requests following in the same e-mail message until another password is specified.
  -
  - ***WEBUPDATES:*** If the object is updated via the "Webupdates" interface the cleartext password has to be entered in the **[Authorisation]** menu first

Crypt CGI Interface to encrypt a clear-text password can be found at:
http://www.ripe.net/cgi-bin/crypt.cgi
This method may be subject to two types of attacks:

- Password cracking. This is the same kind of attack to which normal computer passwords can be subjected to. There are programs available that can be used to attempt to decode the password, either by checking it against dictionaries or by attempting all possible combinations.
- Mail snooping(when submitting updates via e-mail). As the update message contains the password in clear text, there is a chance that the password will be seen if the message is intercepted in transit between the user's system and the database server machine.

- **PGP-KEY- <key ID>**

This is a strong form of authentication. The authentication information is a signature identity pointing to a public key certificate, which is stored in a separate object (**key-cert**). The maintainer is authenticated if the transaction is signed by the corresponding private key. The RIPE NCC does not guarantee that a key belongs to any specific entity; it is not a certificate authority. Anyone can supply any public keys with any ownership information to the database and these keys can be used to protect other objects by checking that the update comes from someone who knows the corresponding secret key.

A **key-cert** object is a database public key certificate that is stored on the server and may be used with a **mntner** object for authentication when performing updates. Currently PGP and GPG keys are supported (DSS/Diffie-Hellman and RSA algorithms).

In order to create a **mntner** with **`auth:` PGP-KEY-<key ID>** you must follow these steps:

1. Create a **mntner** object with any form of authentication ***(not PGP!)***
2. Create a PGP key pair at *http://www.gnupg.org/* (you will get your **key ID** here)
3. create a **key-cert** object (the **key-cert** object will contain your public PGP key in the **`certif:`** attributes and the **key ID** in the **key cert** attribute)
4. modify the **mntner** to include **`auth:` PGP-KEY-<key ID>**

Whenever you update objects protected by a **mntner** with a PGP authentication, include the PGP

signature in the e-mail body or as a MIME attachment.

For more information see : *http://www.ripe.net/db/support/security/pgp.html*
For more information about the free, PGP-like product called Gnu Private Guard (GPG), please see:
http://gnupg.org

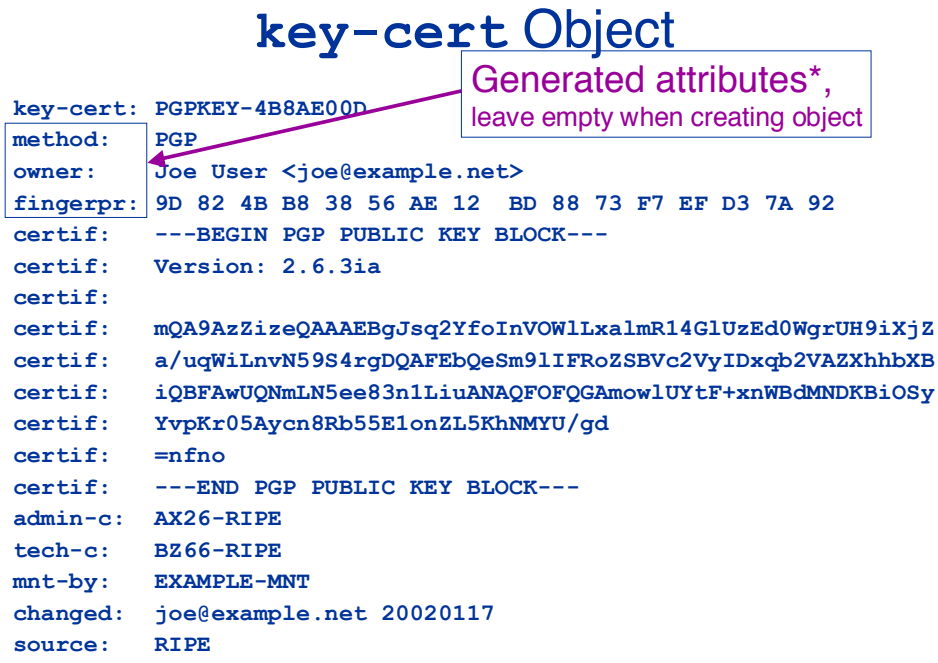


***Fig. 10-2** The **key-cert** object (PGP)*

* It is possible to fill out the 3 generated attributes (**method, owner, fingerprint**) when creating a **key-cert** object. You will only get an error if the generated values don't match with what you have filled out.

10.3 Hierarchical Authorisation (mnt-lower, mnt-routes)

Authorisation of the ***creation*** (only creating) of objects directly (one level) below in the hierarchy of an object type (for **inetnum, route** or **domain** objects) is done by using a **maintainer** in the **`mnt-lower`** and **`mnt-routes`** attributes.

The *allocation* **inetnum** objects are maintained by the RIPE NCC, so you cannot update the allocation for your LIR in the RIPE Database. Please use the Allocation Editor of the LIR Portal (see ***Section 9- LIR Portal***) to update the allocation object with a specified **mntner** in the **`mnt-lower`** and **`mnt-routes`** attributes.

Authorisation of the ***creation*** of route objects is enforced by using the **`mnt-routes`** attribute in the **aut-num** object – (see also ***Section 14.7 RPS Security) .***

It is possible to distribute hierarchical authority over parts of the address space by creating **inetnum** objects with the either **`status:`SUB-ALLOCATED** (but only if qualify for a sub-allocation) or **`status:`LIR PARTITIONED** and by using **`mnt-lower`** and **`mnt-routes`** attributes pointing to the different **mntner** objects (see ***Section 6.1 - Creating Network Objects*** and ***Section 8 Sub-Allocations***).

10.4 Mnt-by, mnt-lower, mnt-routes Attributes in Comparison

10.4.1 The difference between the mnt-lower attribute and the mnt-by attribute.

The **mntner** in the **`mnt-by`** attribute protects the object itself so that no unauthorised person can modify it in the RIPE Database.

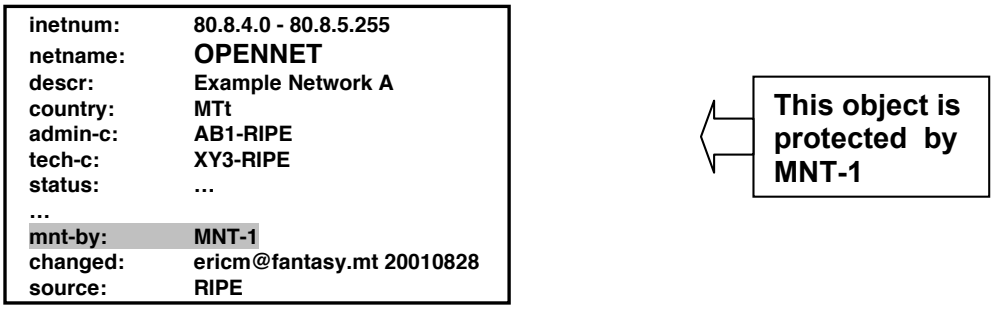


Fig. 10-3 *The first function of the* ***mnt-by*** *attribute*

If you want to update this **inetnum** object you have to pass the authentication of **mntner** MNT-1(e.g. password or PGP-Key).

The **mntner** in **`mnt-by`** attribute of an **inetnum** object also blocks the IP range of that **inetnum** object, so that only those who can pass the authentication of MNT-1 can create new objects in the same range in the RIPE Database:

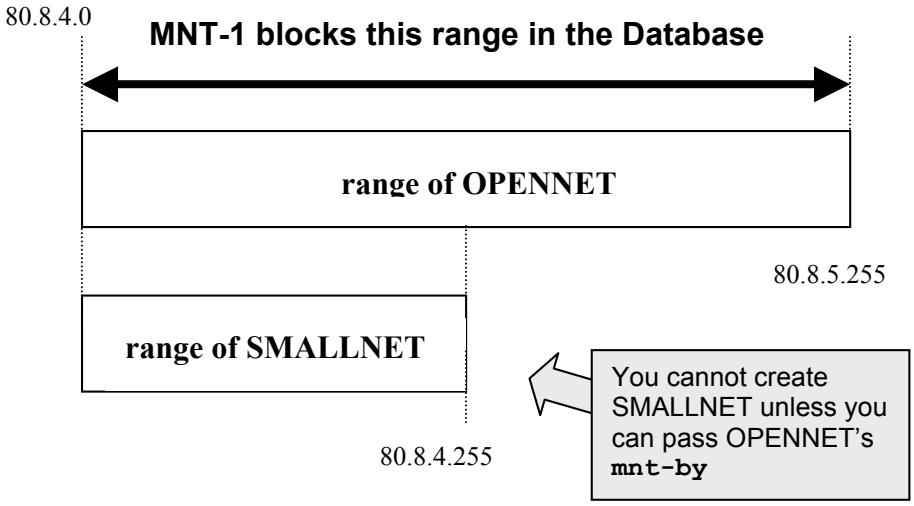


Fig. 10-4 *The second function of the* ***mnt-by*** *attribute*

If there is also a **`mnt-lower`** attribute in the **inetnum** object, then the **mntner** in the **`mnt-by`** attribute will no longer block the range of the object. (The **mntner** in the **`mnt-lower`** will take over this

function)

What is the function of **mnt-lower**?

The **mntner** in the **mnt-lower** attribute doesn't protect the object itself so anyone can change this object below because it has no **mnt-by** attribute:

inetnum:	**81.9.5.0 - 81.9.6.255**
netname:	**WEIRDNET**
descr:	**Example Network Z**
country:	**CS**
admin-c:	**BBB13-RIPE**
tech-c:	**NCN83-RIPE**
status:	**…**
mnt-lower:	**MNT-9**
changed:	**nenadc@chudo.cs 20030918**
source:	**RIPE**

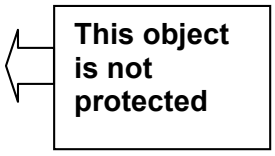


Fig. 10-5 inetnum object with mnt-lower but no mnt-by attribute

The **mntner** in **mnt-lower** attribute of an **inetnum** object only blocks the IP range of that **inetnum** object so that only those who can pass the authentication of MNT-9 can create new objects in the same range in the RIPE Database:

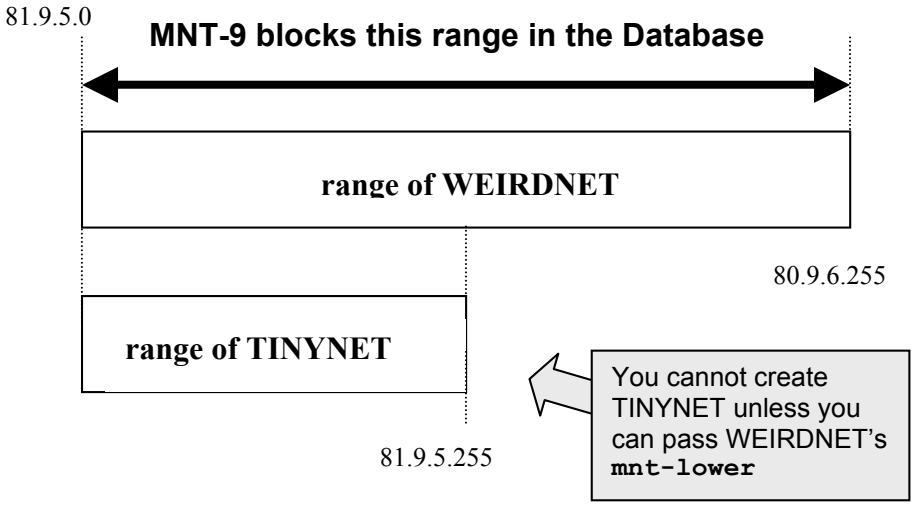


Fig. 10-6 The only function of the mnt-lower attribute

(It would be pointless using only a **mnt-lower** attribute without a **mnt-by** attribute in an **inetnum** object: as the object would not be protected, anybody could delete it, thereby removing the check that **mnt-lower** attribute provided)

Because of this **mnt-lower** should only be used in combination with **mnt-by** in an inetnum object.

- Those who can pass the authentication of the **mntner** in **mnt-by** (MNT-1 in ***Fig. 10-7***) can update (and even delete) the **inetnum** object. They can also create overlapping objects.
- Those who can pass the authentication of the **mntner** in **mnt-lower** (MNT-2 in ***Fig. 10-7***) can only create overlapping objects.

So let us have a look at the example in ***Fig. 10-3*** and ***Fig. 10-4*** again, this time with a **`mnt-lower`** included in the **inetnum** object OPENNET-X

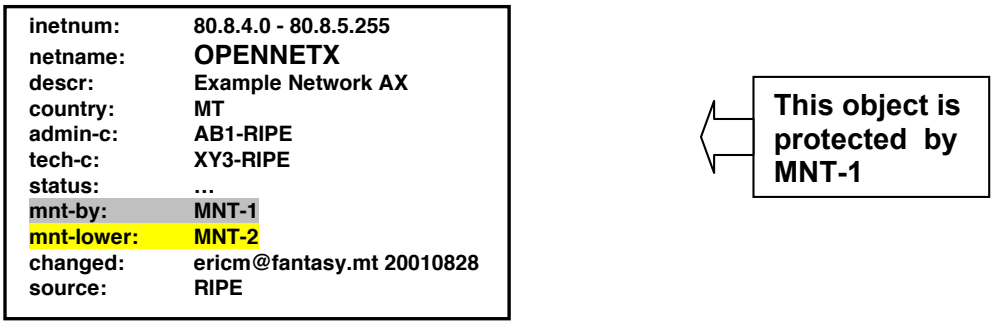


Fig.10 -7 mnt-by and mnt-lower attributes in the inetnum object

If you want to update this **inetnum** object you must pass the authentication of **mntner** MNT-1.

The **mntner** in the **`mnt-lower`** attribute of the **inetnum** object blocks the IP range of that **inetnum** object so that only those who can pass the authentication (MNT-2) can create new objects in the same range in the RIPE Database :

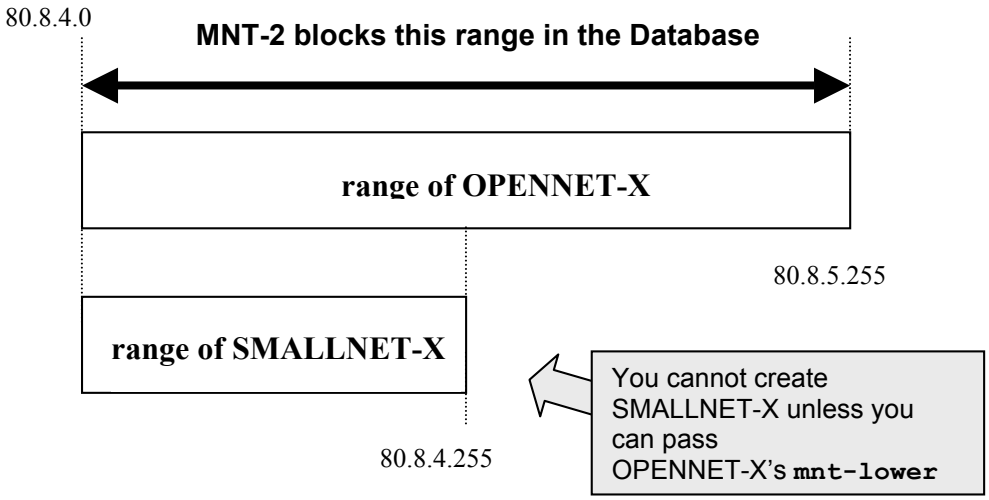


Fig. 10-8 The mnt-lower attribute "protecting the range"

Please note that if there is both a **`mnt-by`** and **`mnt-lower`** attribute in an **inetnum** object, then only the **mntner** in the **`mntner-lower`** blocks the range of the inetnum object. (MNT-2 in ***Fig. 10.7*** and ***Fig. 10.8***)

If you want to create the **inetnum** object SMALLNET-X you must pass the authentication of either the **mntner** referenced in the **`mnt-lower`** or the **mntner** in **`mnt-by`** of OPENNET-X (i.e. MNT-2 or MNT-1) .

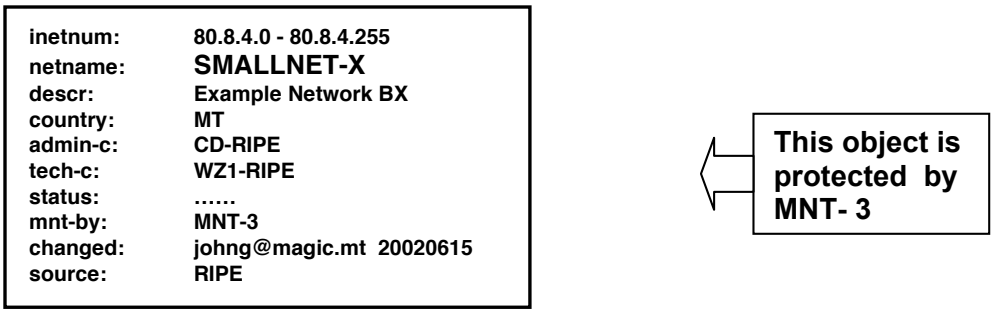


Fig. 10-9 *SMALLNET-X*

If you want to modify the SMALLNET-X **inetnum** object in ***Fig.10-9*** you have to pass the authentication of **mntner** MNT-3.
Note: MNT-1 or MNT-2 which are in the **`mnt-by`** and **`mnt-lower`** attributes respectively of OPENNET-X do not protect SMALLNET-X.

mntners in **`mnt-lower`** or **`mnt-by`** attribute only block the creation of new objects **one level below**.

This means that once you have created the **inetnum** object SMALLNET-X, MNT-2 or MNT-1 will only block the second half of OPENNET-X's range because there is an overlapping object under the first half of the range.

If you do not include a **`mnt-by`** or a **`mnt-lower`** in SMALLNET-X anyone can create new objects in SMALLNET-X's range: 80.8.4.0-80.8.4.255.

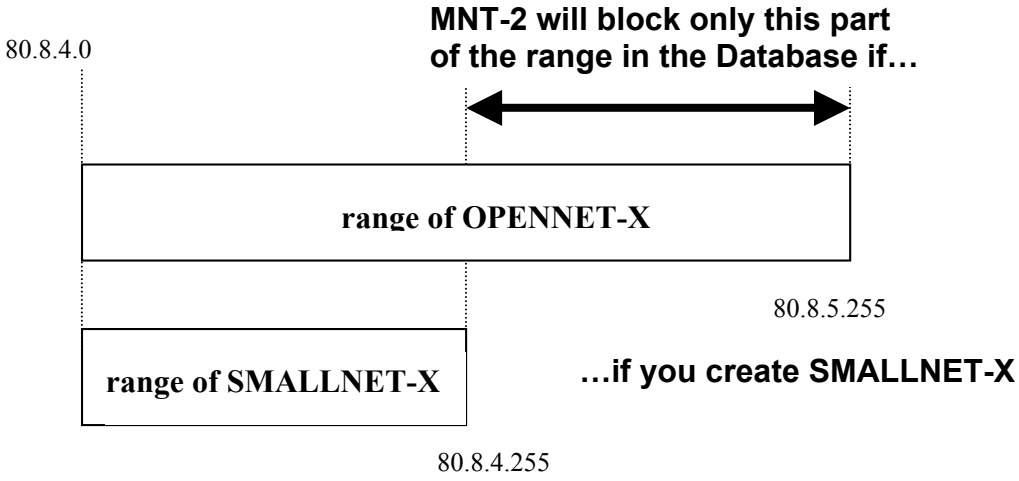


Fig. 10-10 *The **mnt-by** or **mnt-lower** attributes prevent the creation of overlapping objects, but only one level lower*

In your **allocation** object RIPE NCC will include a **mnt-lower** attribute referencing your **mntner**. Therefore only employees of your company who can pass authentication of your **mntner** can create assignment objects inside your allocation range.

10.4.2 The mnt-routes attribute

mnt-routes authorises the creation of new route objects without allowing the updating of other objects already in the RIPE Database.

When creating a new route object, the "relevant" **inetnum** objects, **route** objects and **aut-num** objects in the RIPE Database are checked for authorisation.
Authorisation is provided by the **mntner** in the **mnt-routes** attribute of these objects.

What do we mean by "the relevant objects"? **inetnum** or **route** objects in the RIPE Database that have the same range (or a bigger encompassing range) as the new **route** object that you want to create. The "relevant" **aut-num** object is the one that will be referenced in the **origin** attribute of the new **route** object.

If the relevant objects in the database do not have a **mnt-routes** attribute, **authorisation** for creating a new route object is provided by other **mntners** referenced in the **mnt-by** or **mnt-lower** attribute of these objects.

Not having **mnt-routes** in your **inetnum** objects**, route** objects and **aut-num** objects would mean that you would have to give the password of your **mntner** (MNTR-7 in the example below) to anybody whom you want to permit to create a **route** object referring to your address range or ASN. With this password they could then not only create **route** objects but update your objects or create assignment objects within your allocation as well! Not using **mnt-routes** attributes can be therefore very **DANGEROUS !**

Therefore you should put a **mnt-routes** attribute in your **inetnum**, route and **aut-num** objects to avoid this situation:

...
mnt-by: MNTR-7
mnt-routes: MNTR-9
...

#MNTR-9 is a **mntner** whose password you can share with those who create the **route** object.

#MNTR-7 is your "high security" **mntner** whose password (PGP key) you keep to yourself !

The **mnt-routes** is only checked by the RIPE Database when a new **route** object is created.

See ***Appendices A and G*** for the exact description of the authorisation process for creating a **route** object in the RIPE Database.

10.5 IRT Database Object

The Incidence Response Team (IRT) object, is a new type of object in the database. Its main function is to provide contact information in case you are being spammed or hacked from a certain IP address. **Inetnum** objects now have an additional attribute, the **`mnt-irt`**, which references the appropriate **irt** object. All the contact information can be found in the **irt** object.

Use the **-c** flag when querying the database to find the **irt** object belonging to a given IP address:
Whois –c <ip address>

10.6 Updating Database Objects

The term "updating" refers to creation, modification and deletion of Database Objects.

NOTE: There are three methods to update objects in the RIPE Database:
via the "**e-mail interface**": ***auto-dbm@ripe.net***
using the "**Webupdates**" interface*:* *http://www.ripe.net/webupdates*
(x.509 enabled: : *https://www.ripe.net/perl/webupdates-x509.pl*
or using **"Syncupdates"**: *http://www.ripe.net/db/syncupdates*

In this section we shall explain how to update objects using the e-mail interface. See ***Section 2.4.1 Creating Objects in the RIPE Database using "Webupdates"*** for the explanation of how to update or create objects using "**Webupdates**". The bullet points below apply to all three methods of updating objects.

To **modify** or **delete** an object that is already registered in the RIPE Database, the object must first be retrieved from the database

Things to keep in mind when modifying database objects:

- keep the same primary key ***
- add the changed line to the new version of object (e.g. `changed: jan@bluelight.nl`)
- keep the old changed lines in to show history
- include authentication (PGP signature (only when using e-mail interface) or password)

*** If you change the primary key of an object you are not modifying the object but creating a second object with a different primary key. See ***Appendix 6*** for a list of Database object templates. The primary key is marked for each one of them.

To **delete** an object, use the **exact** copy of the database object (do not forget to use the **–B** flag when querying the object), and add the '**`delete`**' attribute at the end of the object (e.g. `delete: hostmaster@bluelight.nl duplicate object`)

The RIPE NCC recommends that the reason for deleting the object is used as the value of the delete attribute (see the example above). The RIPE NCC keeps logs of deletions and inquiries can be made if necessary.

NOTE: Once the object(s) to be updated are retrieved, they should be copied into an editor, making the necessary changes, and then sent in an e-mail to: ***auto-dbm@ripe.net***

Changing the authorisation of a maintainer object means changing sensitive user data. In those cases (losing/forgetting the password or PGP key) the manual intervention of the RIPE NCC is necessary. A written hardcopy confirmation from the maintainer's admin-c is required, which serves as a form of authentication and authorisation for the change.

So before we can change your maintainer for you please send us a fax on company headed paper with the content generated by using the web interface at:

http://www.ripe.net/cgi-bin/fax.cgi

If you have any more questions, please contact <ripe-dbm@ripe.net>.

10.7 Replacing Assignment inetnum Objects

i) Splitting an approved assignment in the Database
Create two or more new objects
eg. 400 IPs = 3*/25 +/28

i) Merging two assignments (inetnum and/or route objects)
Eg. /25 +/24 =x.y.z.0 - x.y.(z+1).128
Create new object using the 'more recent date of the two' in the changed line.
NB Objects with the attribute **`remark:`INFRA-AW** may not be merged.

In both cases do steps ii) and iii):

ii) Keep the same netname
or inform the RIPE NCC of the change, quoting the original ticket number..

iii) Delete the original object
to avoid overlapping objects

10.8 RIPE Test Database

A TEST Database exists for users to learn how to use the RIPE Database software. The TEST Database uses the same software as the RIPE Database.

- No changes are made in the actual RIPE Database by changing an object in the TEST Database.
- The data in the TEST database is **not** a copy of the data in the RIPE Database. Therefore the data is **not** authoritative data.

You can create or update objects in the RIPE TEST Database either
1 via the "**e-mail interface**": ***test-dbm@ripe.net*** or
2 using "Webupdates" by selecting "RIPE-TEST-DB" in the "Select Source" menu

Creating and updating objects in the TEST database via the e-mail interface:

Send your object to: ***test-dbm@ripe.net***
An acknowledgement message is sent from this e-mail address.

Special Features of the TEST Database

Note:

`source:` attribute value is **TEST** instead of **RIPE**
`nic-hdl:` the nic-hdl you will receive for **person** objects will have the suffix **–TEST**, instead of **-RIPE**
`referral-by:` attribute value for **mntner** objects is **TEST–DBM–MNT** instead of **RIPE–DBM–MNT**

Creating Allocations in the Test Database:
When creating **inetnum** objects in the **TEST DB** with the **status:** attribute **ALLOCATED PA** the **`mnt-by`** attribute has to reference the following **mntner**:
`mnt-by:` **TEST–ALLOCATED–MNT**

(NOTE: authentication is **NONE** for this **mntner**)

Finding objects in the TEST Database:

NOTE: To query the RIPE TEST Database you must specify the hostname of the TEST DB server even when using the RIPE Database web interface:

```
whois -h test-whois.ripe.net <Search String>
```

You can also use the web interface: *http://www.ripe.net/perl/test-whois*

The whois flags that work in the RIPE Database also work in the TEST Database.

10.9 Organisation Object

As of April 2004 the **organisation** object is a new object class in the RIPE Whois Database. Its aim is to provide information identifying an organisation, such as a company, charity or university, which is the holder of a network resource with data stored in the RIPE Database. See the template of the **organisation** object below:

```
organisation:  [mandatory]   [single]      [primary/look-up key]
org-name:      [mandatory]   [single]      [look-up key]
org-type:      [mandatory]   [single]      []
descr:         [optional]    [multiple]    []
remarks:       [optional]    [multiple]    []
address:       [mandatory]   [multiple]    []
phone:         [optional]    [multiple]    []
fax-no:        [optional]    [multiple]    []
e-mail:        [mandatory]   [multiple]    [look-up key]
abuse-mailbox: [optional]    [multiple]    [look-up key]
org:           [optional]    [multiple]    [inverse key]
admin-c:       [optional]    [multiple]    [inverse key]
tech-c:        [optional]    [multiple]    [inverse key]
ref-nfy:       [optional]    [multiple]    [inverse key]
mnt-ref:       [mandatory]   [multiple]    [inverse key]
notify:        [optional]    [multiple]    [inverse key]
mnt-by:        [mandatory]   [multiple]    [inverse key]
changed:       [mandatory]   [multiple]    []
source:        [mandatory]   [single]      []
```

Attributes of the Organisation Object:

`organisation:` Specifies the ID of an organisation object. Organisation IDs are automatically generated by the RIPE Database (Similar to the way nic-hdl-s are generated for person objects.)

The user must fill out the **`organisation`** attribute as AUTO-<digit> e.g. AUTO-1 during the creation of the **organisation** object.

The user can specify initials e.g. AUTO-3AB

The RIPE Database robot will create an **organisation** object (e.g. ORG-AB23-RIPE in the above case)

The organisation ID cannot be reused. If an organisation ID was used previously by an **organisation** object and then deleted, this ID cannot be used in new **organisation** objects.

When an organisation changes name, the "**`org-name:`**" can be modified accordingly. There is no need to change the organisation ID.

`org-name:` Specifies the name of the organisation that this **organisation** object represents in the RIPE Database. This is an ASCII-only text attribute. The restriction is because this attribute is a look-up key. The whois protocol does not allow specifying character sets in queries. The user can put the name of the organisation in non-ASCII character sets in the "descr:" attribute if required.

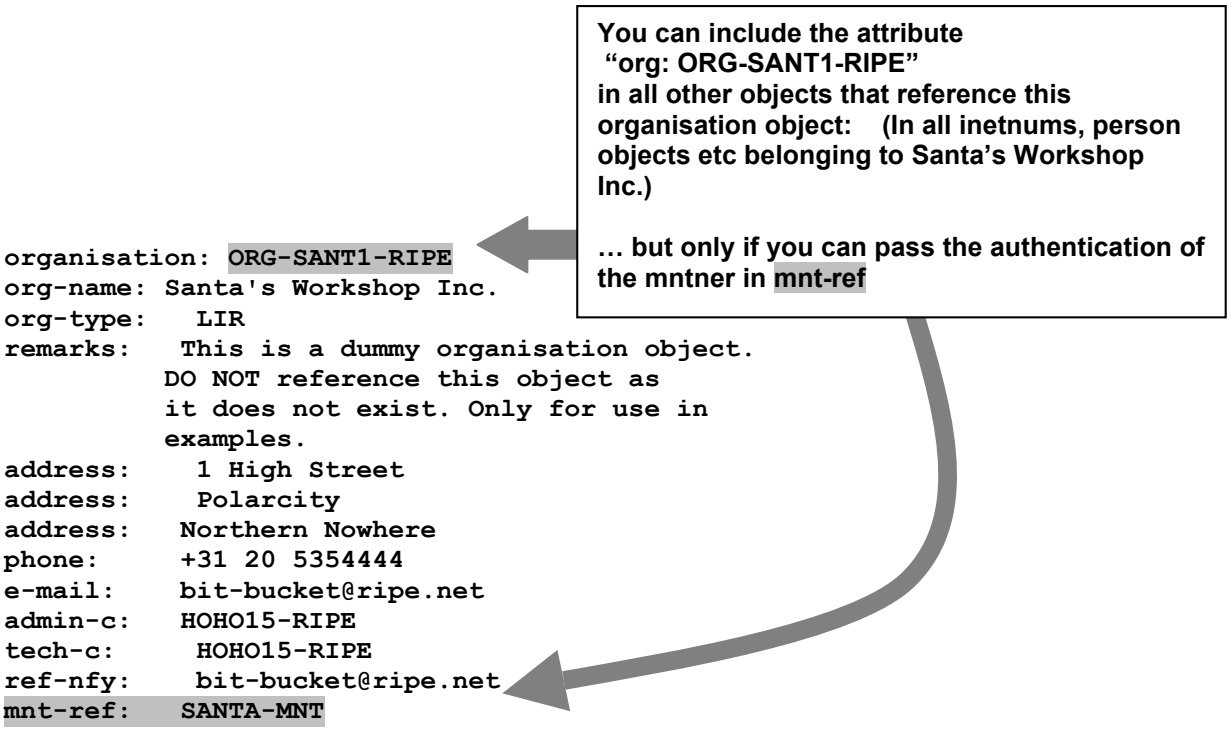
`org-type:` Specifies the type of the organisation. The possible values are IANA for Internet Assigned Numbers Authority, RIR for Regional Internet Registries, NIR for National Internet Registries, LIR for Local Internet Registries, and OTHER for all other organisations.

`ref-nfy:` Specifies the e-mail address to be notified when a reference to the **organisation** object is added or removed. This should be an e-mail address as defined in RFC 2822.

`mnt-ref:` Specifies the maintainer objects that are permitted to add references to the **organisation** object from other objects.

Only if you can pass the authentication of the maintainer in **`mnt-ref`** can you reference the organisation object in another object (using the **"`org:`"** attribute).

See below an example of an **organisation** object:


You can include the attribute
"org: ORG-SANT1-RIPE"
in all other objects that reference this organisation object: (In all inetnums, person objects etc belonging to Santa's Workshop Inc.)
… but only if you can pass the authentication of the mntner in mnt-ref
organisation: ORG-SANT1-RIPE
org-name: Santa's Workshop Inc.
org-type: LIR
remarks: This is a dummy organisation object.
DO NOT reference this object as
it does not exist. Only for use in
examples.
address: 1 High Street
address: Polarcity
address: Northern Nowhere
phone: +31 20 5354444
e-mail: bit-bucket@ripe.net
admin-c: HOHO15-RIPE
tech-c: HOHO15-RIPE
ref-nfy: bit-bucket@ripe.net
mnt-ref: SANTA-MNT
mnt-by: RIPE-NCC-HM-MNT
changed: ripe-dbm@ripe.net
source: RIPE

If you want to reference the **organisation** object above in other objects, you must include the following attribute:

`org:` ORG-SANT1-RIPE

When adding such an **`org`** object attribute to an object the following authorisation check must be passed:

- from one of the **mntners** in the **`mnt-ref`** attributes of the **organisation** object.
- from one of the **mntners** in the **`mnt-by`** attributes of the object being updated

This **`org`** attribute may be included in any object type. It is mandatory in **inetnum** and **inet6num** objects with ALLOCATED PA or ALLOCATED-BY-RIR values. It is also mandatory in all newly assigned **inetnum** objects with the status ASSIGNED PI and in all **inet6num** objects assigned directly by the RIPE NCC with status ASSIGNED. It is mandatory in newly assigned **aut-num** objects. It is optional in all other objects.

To find all objects which include the attribute **`org:` ORG-SANT1-RIPE ,** do an inverse whois query:

-i org ORG-SANT1-RIPE

The RIPE NCC will create an **organisation** object for each LIR.

These **organisation** objects can be edited by the LIR through the LIR Portal. (See ***Section 9***)

For more information about the **organisation** object and how to use it see:
www.ripe.net/db/support/organisation.html

References:

RIPE NCC Database Reference Manual
http://www.ripe.net/ripe/docs/databaseref-manual.html

RIPE NCC Database User Manual: Getting Started
http://www.ripe.net/ripe/docs/db-start.html

RIPE Database Queries Reference Card
http://www.ripe.net/db/support/whois-refcard.pdf

New Values of the "status:" Attribute for Inetnum Objects (LIR-Partitioned)
http://www.ripe.net/ripe/docs/lir-partitioned.html

IRT Object in the RIPE Database
http://www.ripe.net/ripe/docs/irt-object.html

Syncupdates
http://www.ripe.net/db/syncupdates

Organisation Object in the RIPE Database
www.ripe.net/db/support/organisation.html

Protecting Your Data in the RIPE Database (Mntners, Authentication Schemes)
http://www.ripe.net/db/support/security/

PGP Authentication in the RIPE Database
http://www.ripe.net/db/support/security/pgp.html

PKI X.509 Authentication in the RIPE Database
http://www.ripe.net/db/support/security/x509.html

11. REVERSE DELEGATION

11.1 Overview

In this section we will discuss how to set up reverse delegation from the RIPE NCC for the LIR or the LIR's End Users. Specifically how to:

- set up reverse delegation for a /24 range
- set up reverse delegation for multiple /24 ranges (for ranges between the sizes of /23 and/16)
- set up reverse delegation for a /16 range
- make a reverse delegation for an address space smaller than /24

In this section we also discuss how to change and delete an existing delegation, describe common errors and list useful tools.

It is assumed that the reader is familiar with DNS.

For more information see also: http://www.ripe.net/reverse/

11.2 Reverse Address Mapping

What is Forward and Reverse Delegation?

Applications such as FTP, e-mail, and telnet allow users to specify an Internet destination host as a domain name, such as ***www.bluelight.nl***, as names are easier to remember than numbers. However, before an application can send IP packets, the IP address of the destination host must be determined. The **Domain Name System** (DNS) was devised to obtain the IP address for a given domain name. The inverse procedure, which produces the domain name from the IP address, is called reverse address mapping or reverse delegation, and is the focus of this section.

Why is Reverse Delegation Necessary?

In this example FTP is used to illustrate the need for reverse delegation. Many FTP sites want to know which domain is requesting access. If reverse delegation is correctly set up by the domain sending the packet, the accessed domain may successfully trace it back to its origins. (Name-based virtual hosts are an exception). Hosts from address space which have not been reverse delegated may have problems accessing some FTP sites.

Not setting reverse address mapping correctly may have the following consequences:

(a) users are blocked from various services (FTP, mail);
(b) troubleshooting becomes more difficult since lookups cannot find the name of a particular machine and the users cannot be identified;
(c) more network traffic is generated as a result of failing lookup responses.

IN-ADDR.ARPA Domain Tree

Similar to the UNIX file system, the full name of an IP host is determined in a hierarchical fashion. For example, the administration of the top level domain **nl** is performed by a ccTLD administrative person. The subdomain **bluelight** was delegated by them to 'Blue Light Internet', which uses the name **www** to refer to one of the hosts in their network. After the name **www** has been properly specified in the name server for **bluelight.nl**, the domain name **www.bluelight.nl** can be used to find its corresponding Internet host.

The IN-ADDR.ARPA domain tree is described in more detail in Chapters 1 and 2 of O'Reilly's ***DNS and BIND***, 4th Edition.

Reverse Delegation for IPv4 takes place exclusively on octet (/8, /16 and /24) boundaries.

The same mechanism is used in reverse and forward delegation, but the authority of delegation is somewhat different. In order to use the same mechanism as forward DNS, a special domain "in-addr.arpa" is created. An IP address has to be 'reversed' (written in reverse order) and suffixed by **in-addr.arpa**. E.g. in order to reverse map 195.35.65.1, it must become 1.65.35.195.in-addr.arpa .

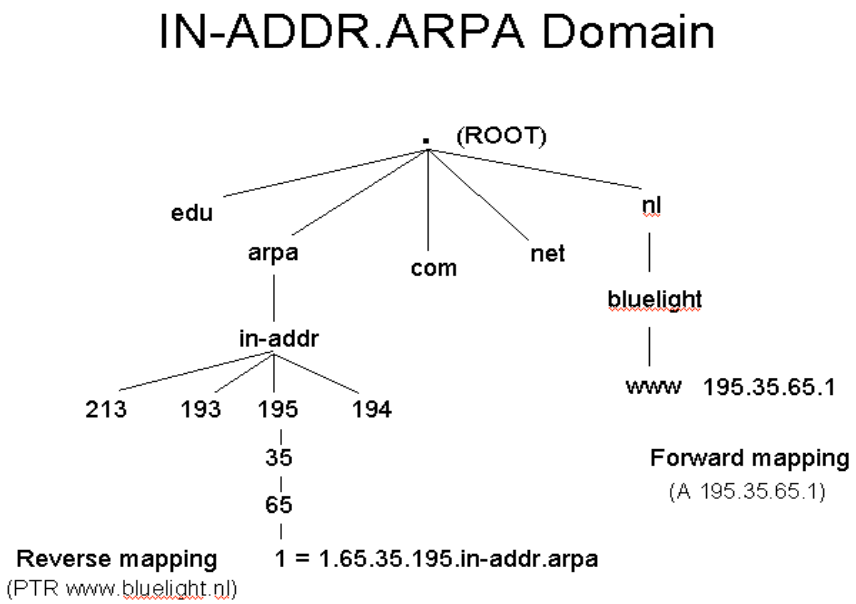


Fig. 11-1 *The in-addr.arpa Domain as Part of the DNS Tree*

11.3 Setting Up Reverse Delegation

You must go through the following steps to obtain reverse delegation for an IPv4 address range:

- Address space to be reverse delegated must be part of an allocation.or part of an ERX transfer
- Set up reverse zones on names ervers
- Set up reverse delegation by creating a **domain** object in the RIPE Database
  - You must pass the corresponding authentications:
  - **mnter** in **mnt-domains** of corresponding **inetnum** (usually allocation)
  - for more details see ***Appendix C***
  - RIPE Database syntax is also checked!

Before the **domain** object is created the following are checked by the system:

- Authentication correct?
- Name servers and zones set up correctly? (RFC 1912)
- Is address space to be delegated part of an allocation?

After the successful creation of the **domain** object in the RIPE Database

- You receive notification from the RIPE Database
- The NS lines are entered automatically into the parent zone file (of RIPE NCC's /8) (This is the actual reverse delegation) (within 2 hours -1 day)
-

11.4 /24 Reverse Zone Setup

It is recommended to use the parameters found in **RFC1912.**

At least two name servers for the zone should be set up. (One primary name server and one secondary.)

- If the /24 is assigned to an End User who wants to run a primary name server, the LIR should run the secondary for backup reasons.
- If the assignment is for the LIR's network, it is also recommended to set up DNS on another network.

Please note that both name servers should **not** be on the same physical subnet, since both will be unreachable in the event of network failure.
It is recommended that the serial numbers be written in YYYYMMDDnn format.

See the RIPE document: ***RECOMMMENDATION FOR DNS SOA VALUES***
http://www.ripe.net/ripe/docs/dns-soa.html

11.5 Setting Up the Delegation : Creating the Domain Object.

domain: 65.35.80.in-addr.arpa
descr: Reverse delegation for Bluelight 2nd /24
admin-c: JJ231-RIPE
tech-c: JAJA1-RIPE
zone-c: WF2121-RIPE
nserver: ns.bluelight.nl
nserver: ns2.bluelight.nl
mnt-by: BLUELIGHT-MNT
changed: jan@bluelight.nl
source: RIPE

Use host names, NOT IP addresses!

The authentication of this maintainer must also be passed to create domain obj.

Do not include the date! The robot will do that.

inetnum: 80.35.64.0-80.35.95.255
netname: NL-BLUELIGHT-20010723
descr: BLUELIGHT INTERNET
country: NL
org: ORG-PIE1-RIPE
admin-c: ABC75-RIPE
tech-c: XYZ13-RIPE
status: ALLOCATED PA
mnt-by: RIPE-NCC-HM-MNT
mnt-lower: BLUELIGHT-MNT
mnt-routes: BLUELIGHT-MNT
mnt-domains: BLUELIGHT-MNT
country: NL
changed: jan@bluelight.nl
source: RIPE

The authentication of this maintainer must be passed in order to create the domain object above and thus receive reverse delegation

Above at the top is a RIPE Database **domain** object for a /24 reverse zone. Its creation will trigger the reverse delegation for 80.35.65/24. The template can be obtained with the ***whois -t domain*** command.

zone-c references the NIC-handle of a person responsible for the zone. The ISP/LIR's maintainer is added to this object to protect it from any interference. In accordance with **RFC 1035**, names should be used in the nserver lines and not IP numbers.

- For IPv4 ranges the reverse domain is in-addr.arpa
- For IPv6 ranges the reverse domain is ip6.arpa (ip6.int is discontinued)

See ***Section 2.4*** for creating objects in the RIPE Database.
See ***Section 10.2 Protecting Database Objects*** for how to pass authentications in the RIPE Database.

11.6 Range Sizes That Can Be Set Up for Reverse Delegation

- All ranges that are part of an allocation or
- All networks transferred to the RIPE Database via the Early Registration Transfer (ERX) Project. The full list of these networks is available at: http://www.ripe.net/projects/erx/erx-ip/

For IPv4 the following size ranges can be reverse delegated: /8 , /16 , /24

> IPv4 Ranges that are between the sizes of a /24 and a /16 (eg,a /23) :
> In this case you must create multiple /24 **domain** objects to cover the entire range.
> If using the RIPE Database e-mail interface, several domains can be included in one e-mail.

For a range of consecutive /24 zones you can use the shorthand notation for the domain attribute:

inetnum: x.y.0.0 –x.y.9.255 ⟹ **domain:** 0-9.y.x.in-addr.arpa

For IPv6 the following size ranges can be reverse delegated: ranges on nibble boundaries (every 4 bits). You cannot use shorthand notation for consecutive IPv6 domains.

11.7 Problems with the Setup?

A RIPE Database error report is sent in case of errors. In this situation the following sites should be consulted before contacting the RIPE NCC:

http://www.ripe.net/reverse

If the problem persists, the full error report should be sent to the following mailbox (human mailbox!):

ripe-dbm@ripe.net.

11.8 Reverse Delegation of a /16 Allocation

Requirements and procedures are the same as for a /24

.Sub-delegations within a /16 delegation

After reverse delegation of a /16 allocation the LIR should continue to check sub-zone set up before further delegation and can use the Delegation Checker *http://www.ripe.net/cgi-bin/nph-dc.cgi*
In this case it will check if the reverse sub-delegation is set up correctly, you will receive a reply with a diagnostics message, but no NS entries will be made into the RIPE NCC parent zone file for the /8 block. No **domain** objects will be created in the RIPE Database.

11.9 Changing / Deleting a Delegation

To change a delegation (e.g. if you moved the zone files to different servers) just retrieve the **domain** object(s) from the RIPE Database

Update the **domain** object in the RIPE Database and the reverse delegation will be automatically updated after the name server checks have been performed.

See ***Appendix D*** for authentication requirements for updating (modifying) a reverse delegation.

Deleting a delegation is simple. Just delete the **domain** object in the RIPE Database. The reverse delegation will be automatically deleted. (Within 2 hours –1 day.)

See ***Section 10.6 Updating/Deleting Objects in the RIPE Database***.

See ***Appendix E*** for authentication requirements for deleting a reverse delegation.

Generally speaking in both cases you have to pass the authentication check of the **mntner** in the **mnt-by** attribute of the **domain** object.

11.10 Common Errors when Setting Up Reverse Delegation.

- No allocation or ERX transfer for the address range to be reverse delegated
- IP addresses instead of names of name servers in the **domain** object
- Trying to get reverse delegation for a range that is not on octet boundaries (/24 or /16)
- Incorrect DNS setup (not according to RFC 1912 or http://www.ripe.net/ripe/docs/dns-soa.html)

For more common errors and solutions to them, see the "***REVERSE DELEGATION FREQUENTLY ASKED QUESTIONS***" at: *http://www.ripe.net/reverse*

11.11 Reverse Delegation for Assignments < /24

The 'classless inaddr' technique described in **RFC 2317** enables the possibility of reverse delegation for prefixes longer than a /24.

However, the RIPE NCC does not directly reverse delegate networks smaller than /24 from Provider

Aggregatable (PA) blocks.

It is therefore the responsibility of the administrator of the /24 address space that encloses the "< /24 " address space in question to co-ordinate reverse delegation.(Usually the LIR). They will set up reverse delegation of the enclosing /24, and then further delegate to their customers as required. You can use the CNAME 'trick' to create the next point in the hierarchy; an example is shown on the next pages.

The procedure and requirements are the same as for /24.

Exception: The RIPE NCC will directly reverse delegate to zones smaller than /24 which are Provider Independent (PI) and do not originate from an LIR's PA allocation. If this applies or questions arise, please contact: ***ripe-dbm@ripe.net***

Sub-delegations within a /24 delegation

After reverse delegation for a /24 allocation the LIR should continue to check sub-zone set up before further delegation and use the robot TEST flag:

The LIR can send in **domain** objects for the sub-delegations to ***auto-dbm@ripe.net*** with the keyword TEST in the subject line. In this case Marvin will check if the reverse sub-delegation is set up correctly and reply with a diagnostics message, but will not make any entries into the RIPE NCC parent zone file for the /8 block or create **domain** objects in the RIPE Database.

Problems with RFC 2317 and Classless Reverse Delegation

Although routing protocols now allow networks to be split in a "Classless" way, the reverse delegation of those networks must still be "Classful" (at first glance) because of the structure of the DNS. However, it is possible to 'delegate' networks smaller than a /24. This means that LIRs should not be able to use reverse delegation as an excuse for assigning addresses in a classful manner.
The classic method for Classful reverse DNS is documented in RFC 2317. Unfortunately, it has a small error in it. It specified the inclusion of an invalid DNS character in a zone file. This can in fact cause problems with the default installations of many name servers, particularly BIND, the Internet's most common name server software.

On the next page there is the example configuration given in the RFC:

```
$ORIGIN 2.0.192.in-addr.arpa.
   @      IN     SOA    my-ns.my.domain. hostmaster.my.domain. (...)
   ;...
   ; <<0-127 /25
   0/25         NS     ns.A.domain.
   0/25         NS     some.other.name.server.
   ;
   1          CNAME   1.0/25.2.0.192.in-addr.arpa.
   2          CNAME   2.0/25.2.0.192.in-addr.arpa.
   3          CNAME   3.0/25.2.0.192.in-addr.arpa.
```

This should be changed to:

```
$ORIGIN 2.0.192.in-addr.arpa.
   @      IN     SOA    my-ns.my.domain. hostmaster.my.domain. (...)
   ;...
   ; <<0-127 /25
   0-127        NS     ns.A.domain.
   0-127        NS     some.other.name.server.
   ;
   1          CNAME   1.0-127.2.0.192.in-addr.arpa.
   2          CNAME   2.0-127.2.0.192.in-addr.arpa.
   3          CNAME   3.0-127.2.0.192.in-addr.arpa.
```

In the example above, the delegated domain is defined as [firstaddress]-[lastaddress] rather than using the CIDR notation "slash".
It is not necessary to use CIDR at all in this method. If you want to, you could delegate hosts 13-98 (or any other range) with this method. This means that you will never have to assign a customer a single IP address more than they absolutely require.

Here is a final example of a complete zone file with the reverse DNS for various small CIDR blocks 'delegated' to customers' nameservers.

```
@            SOA          ns0.bluelight.nl.     hostmaster.bluelight.nl. (
                              2000071701  ;serial (version)
                              86400       ;refresh period
                              7200        ;retry refresh this often
                              3600000     ;expiration period
                              172800      ;neg cache
                              )

;; First put in NS records for the domain itself.
                               NS      ns0.bluelight.nl.
                               NS      ns3.colocation.com.

;; Then put in NS records to delegate the made-up domain to your
;; customer's nameservers.
;; Do not use the "/" as documented in RFC 2317. This will break stuff.
;; Use the first and last host delegated as this is obvious and will
;; make support calls much easier.

;; First customer, Goody2Shoes, has been assigned /27,  hosts 0 - 31.

0-31                           NS       ns0.goody2shoes.nl.
0-31                           NS       ns2.bluelight.nl.

0                             CNAME     0.0-31
1                             CNAME     1.0-31
...
31                            CNAME    31.0-31
;; Second customer has been assigned hosts 32 - 71. He has a /27
```

```
;; and a /29. Although these must be routed as two routes
;; they can be delegated as one domain.

32-71                       NS        ns.cyberfalafel.nl.
32-71                       NS        ns2.bluelight.nl.

32                          CNAME     32.32-71
33                          CNAME     33.32-71
...
71                          CNAME     71.32-71

;; And now the customer who does not want to run any nameservers:

73      PTR  www.onionblurp.nl.

;; EOF
```

Obviously, the customer needs to have a matching zone on his system. It is not really very different from any other DNS zone. It would look like this:

```
@       SOA        ns.cyberfalafel.nl.     hostmaster.cyberfalafel.nl. (
                           2000070701  ;serial (version)
                           86400       ;refresh period
                           7200        ;retry refresh this often
                           3600000     ;expiration period
                           172800      ;neg cache
                           )

                           NS        ns.cyberfalafel.nl.
                           NS        ns2.bluelight.nl.
                           NS        ns.thirdpartycolocatednameserver.net.

32                         PTR       network.cyberfalafel.nl.
33                         PTR       ns.cyberfalafel.nl.
34                         PTR       nntp.cyberfalafel.nl.
35                         PTR       office.cyberfalafel.nl.
36                         PTR       warez.cyberfalafel.nl.
37                         PTR       napsterproxy.cyberfalafel.nl.
38                         PTR       illegalcontent.cyberfalafel.nl.
39                         PTR    virusandwormdevelopment.cyberfalafel.nl.
40                         PTR       gateway.cyberfalafel.nl.
41                         PTR       natpool1.cyberfalafel.nl.
42                         PTR       mailgate.cyberfalafel.nl.
…
71                         PTR       broadcast.cyberfalafel.nl.
```

11.12 Useful Tools

The three tools (nslookup, host, dig) provide much the same functionality. They differ in how they present information and how much information is provided by default.

- **nslookup (as part of BIND)**

  ftp://ftp.isc.org/isc/bind/src/cur/

  nslookup: most widespread, distributed with BIND, used in the 'DNS and BIND' book. This tool is being phased out in the latest version of BIND.

- **host**

  ftp://ftp.ripe.net/tools/dns/host.tar.Z

  host: is used by the RIPE NCC for the hostcount as it provides useful statistics features.

- **dig**

  ftp://ftp.isi.edu/pub/dig.2.0.tar.Z

  dig: is similar to **host** but tends to be used by more experienced individuals as it provides exactly the information it receives back.
    - almost the same output is received from dig as from 'host -d'....

  More detailed information about tools to manage DNS can be found at:
  http://www.dns.net/dnsrd/tools.html

References:

RIPE NCC REVERSE DELEGATION WEBPAGES
http://www.ripe.net/reverse

POLICY FOR REVERSE DELEGATION OF IPV4 AND IPV6 ADDRESS SPACE IN THE RIPE NCC SERVICE REGION
http://www.ripe.net/ripe/docs/rev-del.html

OBTAINING REVERSE DELEGATION FROM THE RIPE NCC
http://www.ripe.net/reverse

IPV4 ADDRESS ALLOCATION AND ASSIGNMENT POLICIES IN THE RIPE NCC SERVICE REGION
http://www.ripe.net/ripe/docs/ipv4-policies.html

COMMON DNS OPERATIONAL AND CONFIGURATION ERRORS
ftp://ftp.ripe.net/rfc/rfc1912.txt

CLASSLESS IN-ADDR.ARPA DELEGATION
ftp://ftp.ripe.net/rfc/rfc2317.txt

RECOMMENDATIONS FOR DNS SOA VALUES
http://www.ripe.net/ripe/docs/ripe-203.html

ZONE DELEGATION CHECKER
http://www.ripe.net/cgi-bin/nph-dc.cgi

12. DIRECT RESOURCES

Direct resources are resources that are assigned directly by the RIPE NCC to an End User, End Users are not members of the RIPE NCC, they are not LIRs.

Such Direct Resources can be:

- Autonomous System (AS) Numbers
- Provider Independent (PI) Addresses
- IPv4 or IPv6 Internet Exchange Point (IXP) Assignments
- Anycasting Assignments (IPv4 or IPv6)

The above Direct Resources can be requested in two ways to the End Users:

- “directly” from the RIPE NCC
- “indirectly” via a sponsoring LIR

12.1 End User requesting resources ‘indirectly’ via a sponsoring LIR

If the End User chooses to request any of the listed “Direct Resources” via a sponsoring LIR, then

- the End User must find an LIR who will request the resources their behalf from the RIPE NCC
- the End User will have to sign an ‘End User Assignment Agreement’ with the LIR
- the LIR will request the resources on the End User’s behalf from the RIPE NCC

This method is the most common, more usual than the one described in ***Section12.2*** below.
It is the method that is described in detail in Sections ***13 PI Address Space, 14.3 How to get an AS Number, 16.5 IPv6 Assignments to IXPs***

12.2 End User requesting resources ‘directly’ from the RIPE NCC

If the End User chooses to request any of the “Direct Resources” from the RIPE NCC directly,

- they have to apply to become a Direct Assignment User.
- they have to sign an ‘End User Assignment Agreement’ with the RIPE NCC
- they have to request the resources via email. (Not The LIR Portal)

You can apply via this webpage to become a Direct Assignment User:

http://ripe.net/membership/index.html
(Choose Direct Assignment User option, not the member option)

A Direct Assignment User will receive a so-called RegID from the RIPE NCC to identify their organisation in all communications with the RIPE NCC.
They will pay a yearly fee to the RIPE NCC.
Direct Assignment Users, however, are not members (LIRs) of the RIPE NCC. They cannot use the RIPE NCC member services:

- they cannot use the LIR Portal to request resources from the RIPE NCC, since they do not receive a Portal account
- they cannot vote at the RIPE NCC General Meeting

To request resources from the RIPE NCC, Direct Assignment Users must send in a request by email to: ***hostmaster@ripe.net.***

The appropriate request form can be found here:
http://ripe.net/ripe/docs/index.html

References:

DIRECT INTERNET RESOURCE ASSIGNMENTS TO END USERS FROM THE RIPE NCC
http://ripe.net/ripe/policies/proposals/2007-01.html

CONTRACTUAL REQUIREMENTS FOR PROVIDER INDEPENDENT RESOURCE HOLDERS IN TH RIPE NCC SERVICE REGION
http://ripe.net/ripe/draft-documents/ripe-new-draft2007-01-v4.html

END USER ASSIGNMENT AGREEMENT
http://www.ripe.net/ripe/draft-documents/gm-october2008/end-user-agreement.html

REQUEST FORMS
http://ripe.net/ripe/docs/index.html

RIPE NCC CHARGING SCHEME 2011
http://www.ripe.net/ripe/docs/charging.html

INDEPENDENT INTERNET NUMBER RESOURCES - CONTRACTUAL RELATIONSHIP CHANGES BETWEEN SPONSORING LIR AND END USER
http://www.ripe.net/ripe/docs/ripe-475.html

13. PI ADDRESS SPACE

This section describes the difference between Provider-Aggregatable (PA) and Provider Independent (PI) address space. The advantages and disadvantages of both address assignments should be made clear to the end-user.

PI versus PA Assignments

So far in this Reference Booklet whenever talking about **assignments** we have always implied **PA assignments.**

Provider **A**ggregatable (= non-portable) addresses are assigned out of an LIR's allocation block. The advantage of these addresses is that ISPs assign this address space in a way that routing information for many End Users can be aggregated once it leaves the provider's routing domain. After an End User leaves the service provider that assigned the address space, it can be assigned to another End User. A disadvantage is that each time a user leaves a service provider (LIR), the addresses have to be returned to the PA allocation of the former provider, i.e. the user has to renumber the network.

Provider **I**ndependent (portable) address space is assigned separately, most often from Regional Internet Registries and not from an LIR's PA allocated block. The apparent advantage of PI address space is that the user does not have to reconfigure their hosts and routers if they decide to leave a particular service provider. But the LIR may have routing problems. All PI assignments are entered in the RIPE database by a RIPE NCC IP Resource Analyst. PI assignments are maintained by the RIPE NCC Hostmaster's Maintainer.

Requesting PI Space

In this section we describe how the LIR can request PI addresses for an End User.
The End User also has the option of becoming a "Direct Assignment User" and request PI themselves directly from the RIPE NCC. That is described in ***Section 12.2*** in ***Section 12 Direct Resources***

If the LIR wants to request PI addresses on behalf of an End User then the LIR must first sign a contract with the End User (see in ***Section 12.1*** and the sample contract in the References at the end of ***Section 12 Direct Resources***)
The LIR must then use the ***"PROVIDER INDEPENDENT (PI) ASSIGNMENT REQUEST FORM"*** ..

The request procedure for PI space is almost identical to the request procedure for PA address space described in *Section 4- Assigning (PA) Address Space and Section 5- Evaluation of Address Space Requests)*. The **two main differences** are:

- a different request form (with 2 additional templates) is used for PI assignments:
  - #[INITIAL INFORMATION]#
  - #[DATABASE TEMPLATE]#
- the RIPE NCC IP Resource Analyst creates the **inetnum** object for the PI assignment in the RIPE Database

Please read Sections ***4 and 5: Assigning (PA) Address Space*** and ***Evaluation of Address Space Requests*** for an explanation of the request form templates and procedures that are similar for PA and PI requests.

There are 2 additional templates in the ***PI ASSIGNMENT REQUEST FORM***:

The first additional template is **#[INITIAL INFORMATION]# .** In this template you should provide the information to explain why PI address space is requested instead of PA Address Space.

It is important that you answer all 3 questions in the **#[INITIAL INFORMATION]#** template in the request form completely and accurately, otherwise the request cannot be approved.

See below how to fill out the **#[INITIAL INFORMATION]#** template. The text from the form itself is in bold font, the explanatory notes are in normal font.

#[INITIAL INFORMATION]#

Please read the following information and answer the questions.
1. Why is PI space required rather that PA space?
why-pi?

In order for the RIPE NCC to approve an assignment of PI address space, you must explain why PI space is needed and why PA does not fulfill the needs of the user.

Please check that you are not requesting extra address space for routing or administrative reasons.
routing-reasons:

In view of the goal of conservation of address space, it is not acceptable to request a larger number of IPs than is actually needed, such as to facilitate routing or network administration.

Please confirm whether you have made the End User aware of the warning given in the RIPE document "Provider Independent vs Provider Aggregatable Address Space" , section 3, Detailed Recommendations".
confirmation:
This explains that the End User should understand that PI space may be more difficult or expensive to have routed than PA space. This is described in the passage below from the "Provider Independent vs Provider Aggregatable Address Space" document:

"LIRs will give those End User requesting PI space this or similar warning: Assignment of this address space is valid as long as the criteria for the original assignment are still met. However, assignment of address space does NOT imply that this address space will be ROUTABLE ON ANY PART OF THE INTERNET. It is expected that the users will have to pay a premium for actual routing of PI addresses as opposed to PA addresses. It may eventually become impossible to get relatively small amounts of PI space routed on most of the Internet. We strongly suggest you contact any prospective service provider for information about the possibility and pricing of service when using PI addresses."

You can also refer the End User to the IPv4 policy document, which says:

"Provider Independent Address Space (PI)
In contrast to PA address space, PI address space in not aggregatable but remains assigned to the original network as long as the criteria for the original assignment are met. However, PI addresses are expensive to route as no use can be made of aggregation and therefore might not be globally routable.
PLEASE NOTE THAT THE USE OF PA ADDRESS SPACE SHOULD ALWAYS BE RECOMMENDED.
LIRs must make it clear to the End User which type of address space is assigned. Clear contractual arrangements that specify the validity and duration of the address assignment are strongly recommended for every address assignment."

The RIPE NCC needs a confirmation that the LIR has passed this warning on to their customer/End User and that the End User understands and accepts these conditions.

You are required to confirm that the points mentioned above have been read and understood and that the organisation requesting PI space is fully aware of the disadvantages of PI address space.
(confirm here)

End of #[INITIAL INFORMATION]# template

The second type additional template(s) found only in the **"*PROVIDER INDEPENDENT (PI) ASSIGNMENT REQUEST FORM*"** are **#[DATABASE TEMPLATE(S)]# .**

See below for how to fill out this template. The text from the request form itself is in bold font, the explanatory notes are in normal font.

#[DATABASE TEMPLATE(S)]#

Please include database templates here so that the Hostmaster can register the assignment in the RIPE Database. Where it is necessary to create a maintainer ("mntner") object please include that template too.
Hostmasters will not create person objects for you.

inetnum: *leave empty*
netname: *specify a netname here*
descr: *specify company name of the organisation*
country: *specify the country*
org: specify org ID here*
admin-c: *insert the nic-handle of the administrative contact*
tech-c: *insert the nic-handle of the administrative contact*
status: ASSIGNED PI
notify: *specify e-mail address here*
mnt-by: *specify mntner name here*
mnt-by: RIPE-NCC-HM-PI-MNT
mnt-lower: RIPE-NCC-HM-PI-MNT
mnt-routes: *specify mntner name here*
mnt-domains: *specify mntner name here*
changed: hostmaster@ripe.net
source: RIPE

On the next page you can see an example of how this template should be filled out.

All the other templates in the ***PROVIDER INDEPENDENT (PI) ASSIGNMENT REQUEST FORM*** are identical to the templates in the ***PROVIDER AGGREGATABLE (PA) ASSIGNMENT REQUEST FORM.*** See sections ***4*** and ***5*** **("*Assigning (PA) Address Space"*** and ***"Evaluation of Address Space Requests")*** on how to fill out these other templates.

- End Users should be informed about the implications of PI address space, referencing the RIPE document ***PROVIDER INDEPENDENT VERSUS PROVIDER AGGREGATABLE ADDRESS SPACE.***
- End User contracts should clearly state the kind of address space (PA or PI). The LIR should make contractual arrangements with the End User in order to clarify the status of the address space. Otherwise the End User might not understand the implications of his or her decision. See
- An explanation of why a request is being made for the use of PI address space is necessary for RIPE NCC IP Resource Analysts evaluating requests.

The completed Provider Independent (PI) Assignment request form should be sent to ***hostmaster@ripe.net*** **.**

Alternatively you can request PI Addresses **online** via the **LIR Portal**.

Assigning PI Space

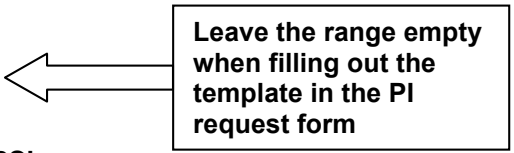
After evaluation of the PI address space request by a RIPE NCC IP Resource Analyst, the RIPE NCC assigns the address block and enters the range in the RIPE database. The RIPE NCC Hostmaster **mntner** is referenced in this object (see example below).

Please note:

- Requested PI assignments will be treated as all other assignments. The RIPE NCC will not assign a larger block purely for routing reasons.
- The RIPE NCC recommends that end-users use PA addresses as a small amount of addresses can be easily renumbered if necessary.
- As the RIPE NCC does not accept address space requests directly from end-users, a PI request must be made through a LIR.
- As with PA assignments, PI assignments are only valid as long as the original criteria on which the assignment was based are still valid. If an assignment is made for a specific purpose and the purpose no longer exists, the assignment is no longer valid.

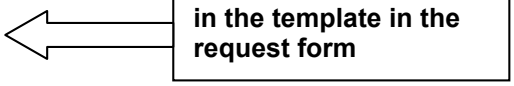
Example: RIPE Database Entry

(The PI assignment object will be created by a RIPE NCC IP Resource Analyst based on the completed template in the request form)



inetnum: 194.1.208.0 - 194.1.215.255
netname: GOODY2SHOES-2
descr: Own Private Network 4 Goody2Shoes
descr: Amsterdam, Netherlands
country: NL
org: ORG-PIE1-RIPE
admin-c: PIBA2-RIPE
tech-c: JAJA1-RIPE
status: ASSIGNED PI

```
mnt-by:      RIPE-NCC-HM-PI-MNT
mnt-lower:   RIPE-NCC-HM-PI-MNT
mnt-by:      BLUELIGHT-MNT
mnt-routes:  BLUELIGHT-MNT
mnt-domains: BLUELIGHT-MNT
changed:     hostmaster@ripe.net 19991111
source:      RIPE
```



This **inetnum** object example shows the status and **mnt-by** attributes in a PI assignment that are the significant differences compared to **inetnum** objects representing PA assignments.

Where Do New PI Addresses Come from?

At recent RIPE Meetings (2005-2008), the RIPE NCC reported a steady rise in requests from LIRs for PI address space for End User networks. RIPE NCC have reclaimed and recycled space from closed LIRs, but at the time of writing (October 2009) we are nearing the point where the available PI space will run out.

In the past, RIPE NCC made PI assignments from former Class C space (193/8 and 194/7). Because of the increasing demand for PI space, the RIPE NCC made sure that they would be able to use some of their most recent allocation of address space to meet future requests. The range 91.192/10 has been designated or PI assignments to End User networks

When the Class C space is exhausted, the RIPE NCC will start to make PI assignments from 91.192/10. This will be announced when it happens. Although the RIPE NCC will put additional RIS beacons in place to make route announcements, you may need to update any filters that you have in place.

References:

PROVIDER INDEPENDENT (PI) ASSIGNMENT REQUEST FORM
http://www.ripe.net/ripe/docs/pi-requestform.html

SUPPORTING NOTES FOR THE PROVIDER INDEPENDENT (PI) ASSIGNMENT REQUEST FORM
http://www.ripe.net/ripe/docs/pi-requestsupport.html

ADDRESS SPACE MANAGED BY THE RI PE NCC
https://www.ripe.net/ripe/docs/ripe-ncc-managed-address-space.html

IPV4 ADDRESS ALLOCATION AND ASSIGNMENT POLICIES IN THE RIPE NCC SERVICE REGION
http://www.ripe.net/ripe/docs/ipv4-policies.html

14. AUTONOMOUS SYSTEM NUMBERS AND THE ROUTING REGISTRY

14.1 Overview

In this section we will discuss how to request an AS number, how to create route objects and how to use the Routing Registry. How to use the relevant tools will also be discussed here.
You can find more information on this subject in the RIPE NCC's Routing Registry Training Course:
http://www.ripe.net/training/rr/

14.2 Definitions

Policy Based Routing

Policy based routing comes into the picture when a provider wants to specify routing preferences. Routing policies depend on agreements between peers and are normally based on political, economic or security-related considerations.

Autonomous System

A group of networks that operate under the same routing policy is called an Autonomous System. An example is a multihomed provider's network together with its customers' networks.

Each Autonomous System has a uniquely assigned number. AS numbers are 16 or 32 bits long binary numbers. They are allocated by IANA to the Regional Registries who in turn assign them to the LIRs and End Users. The AS number, together with the routing policy of the Autonomous System, is registered in the Routing Registry. The AS administrators are responsible for keeping the information up to date. Whenever there is a change of policy, such as peering agreements coming to an end and/or new agreements are being set, the information in the Routing Registry must be updated.

> You do not need an AS number just in order to multihome. You can multihome with or without having your own AS number. These are the possible ways of multihoming:
>
> Having PA or PI addresses and your own AS number
> Having PA or PI addresses and using your upstream provider's AS number

14.3 How to Get an AS Number

An LIR should request AS number either for itself or on behalf of its End User by filling out the RIPE document ***AS Number Request Form .***
If the LIR is requesting the ASN for an End User it should first sing an End User Assignment Agreement with the End User. (See Section ***Section 12.1*** in ***Section12 Direct Resources*** and a sample contract in the References at the end of in ***Section12 Direct Resources.***)
If the End User wants to request an AS number directly from the RIPE NCC without an LIR's assistance, then they must first become a so-called 'Direct Assignment User'. For more information See ***Section 12.2*** in ***Section12 Direct Resources*** .

The ***AS Number Request Form*** form has the following fields and templates:

- ***legal-organisation-name*** for which the AS number is requested
- ***address space to be announced.*** The prefixes to be announced by this AS number
- ***pending-ticket-ID*** of any pending request for address space
- ***peering*** contacts (list of their e-mail addresses)

- **aut-num** object template
- **mntner** object template (to be filled out if necessary)

Please sign the form: state your name at the bottom of the request under the #[END of REQUEST]# line.

For a complete explanation on how to fill out the request form read the "***SUPPORTING NOTES FOR THE AS NUMBER REQUEST FORM.***

The completed request form should be submitted to ***hostmaster@ripe.net***.

You can also fill out the AS Request Form **online** via the **LIR Portal.**

When filling out the **aut-num** object template in the request form the placeholder **AS-NEW** can be used instead of unique AS number in order to specify your Autonomous System for expressing routing policies.
The **`export:`** attribute describes announcements that AS-NEW makes towards peers.
The **`import:`** attribute describes the announcements that AS-NEW "listens" to.

"pref" = 65336 - (BGP)localpref. The higher the value of 'localpref', the lower the value of 'pref'. The lower the value of 'pref' is the more preferred a route is.

Before assigning the AS number, RIPE NCC IP Resource Analysts will check the following:

- Does the customer requesting an AS number have address space?
- Is the customer (planning to be) multi-homed?
- Is the routing policy specified in the application form consistent?
- Is it possible to use private AS numbers (**AS > 64511**)

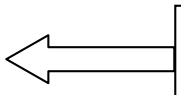
After approval, RIPE NCC IP Resource Analyst creates **aut-num** object and informs requestor.

The user will then create a route object(s) for the **route(s)** announced from this AS.

It is the user's responsibility to keep their **aut-num** up to date. It is also the user's responsibility to keep the routing policy and the information about referenced contact persons up to date in the Routing Registry (RIPE Database).

An example of a completed **aut-num** template:

```
aut-num:     NEW
as-name:     BLUELIGHT-AS
descr:       Bluelight  AS
import:      from AS2 action pref=20; accept AS2
import:      from AS3 action pref=100; accept ANY
import:      from AS2 action pref=200; accept ANY
export:      to AS2 announce NEW
export:      to AS3 announce NEW
org:         ORG-PIE1-RIPE
admin-c:     JJ231-RIPE
tech-c:      JAJA1-RIPE
mnt-by:      NEW-MNT
mnt-routes:  NEW-MNT-TWO
changed:     hostmaster@ripe.net
source:      RIPE
```



Don't include the date in the template in the request form

14.4 32 Bit AS Numbers

From 1 January 2007, the RIPE NCC can assign 32-bit (4 Byte) Autonomous System Numbers (ASNs).

From 1 January 2010 the RIPE NCC will cease to make any distinction between 16 bit only AS Numbers and 32 bit only AS Numbers, and will operate AS Number assignments from an undifferentiated 32 bit AS Number allocation pool.

Terminology:

"2-byte (16 bit) only AS Numbers" refers to AS Numbers in the range 0 - 65535

"4-byte (32 bit) only AS Numbers" refers to AS Numbers in the range 65536– 4294967296

"4-byte AS Numbers" refers to AS Numbers in the range 0 - 4294967296

There is more information about this policy in the RIPE Document "***AUTONOMOUS SYSTEM (AS) NUMBER ASSIGNMENT POLICIES AND PROCEDURES:***
https://www.ripe.net/ripe/docs/asn-assignment.html

For the ***TEXTUAL REPRESANTATION OF AS NUMBERS*** see:
http://www.ietf.org/rfc/rfc5396.txt

Details of how to request a 32 bit ASN are in the RIPE Document***: "SUPPORTING NOTES FOR THE AUTONOMOUS SYSTEM NUMBER REQUEST FORM:***
http://www.ripe.net/ripe/docs/asnsupport.html

ASN32 objects will appear in the RIPE Database from 1 January 2007.

The introduction of 32-bit ASNs may have an effect on tools that query the RIPE Database or those based on RPSL. A test server is available. There is more information at:

http://www.ripe.net/news/asn-test-server.html

Sites using the RIPE Database software will probably have to upgrade
their systems, see:
http://www.ripe.net/news/asn-db-update.html

For more information, please contact us at <asn32@ripe.net>.
Answers to frequently asked questions will appear in the RIPE NCC FAQ at:
http://www.ripe.net/info/faq/

14.5 Internet Routing Registry (IRR)

The Internet Routing Registry (IRR) is a globally distributed routing information database.

The IRR was established in 1995. Its purpose is to ensure stability and consistency of the Internet-wide routing by sharing information between network operators. The IRR consists of several databases in which network operators can publish their routing policies and their routing

announcements such that other network operators can make use of the data. In addition to making Internet topology visible, the IRR is used by network operators to look up peering agreements, determine optimal policies, and more recently, to configure their routers.

Each Regional Internet Registry has its own network information database, part of which is used for routing information. APNIC however, not being a full Routing Registry, only publishes AS numbers without policy details. **RADB** and **RIPE** are both public databases (registries) where any ISP can publish their policies. **C&W**, a private database, contains the routing policies of the networks and customer networks of C&W. Most of these databases also mirror each other. This means registering is only necessary in one database. To retrieve info from all the mirrored databases, you can query RIPE DB using the "-a" flag. A List of all the routing registries (databases) mirrored by the RIPE database can be found at: ***http://www.ripe.net/db/mirrored.html***

The benefits of the IRR are only realised when registered routing policies are kept up to date, and reflect routing announcements in the 'real world'.

14.6 The Route Object

> The **route** object represents a route in the Internet.

A route in the Internet is information about how to reach a network and a "promise" to accept data. A route is represented as a prefix, which is the network part of the address that points to the network in question, and the originating AS number. ***Both*** prefix and the originating AS number are the primary key for the **route** object. Contact details about persons responsible for a given network can be found in **aut-num** object, referenced in **`origin`** attribute.

> It is the responsibility of the LIR to create **route** objects for the address space originating from their AS.
>
> Please note that there are **multiple authorisation checks** required when creating a route object. See the flowcharts in ***Appendix A*** and ***B*** for more details.

See also ***RPS Security*** for more details.

14.7 RPSL

The RIPE Routing Registry is a subset of the RIPE database and was built on a syntax that is described in the **Representation of IP Routing Policies in a Routing Registry (ripe-181)**. **ripe-181** syntax is replaced by the "Routing Policy Specification Language" (RPSL).

Additional changes in the Routing Registry due to the RIPE Database Migration to RPSL:

Set objects

To specify policies, it is often useful to define sets of objects. For this purpose we define **as-set**, **route-set, rtr-set, filter-set,** and **peering-set** objects. These objects define a named set. The members of these sets can be specified either directly by listing them in the sets' definition, or indirectly by having member objects refer to the sets' names, or a combination of both methods.

The **as-set** replaces the object called **as-macro**, and the **route-set** the object called **community** -- in RIPE-181.

A set's name is an rpsl word with the following restrictions: All **as-set** names start with prefix "as-". All **route-set** names start with prefix "rs-". All **rtr-se**t names start with prefix "rtrs-". All **filter-set** names start with prefix "fltr-". All **peering-set** names start with prefix "prng-". For example, as-foo is a valid **as-set** name. In addition, these reserved prefixes should ***not*** be used to start the name of any other objects (e.g. **mntner**).

Set names can also be hierarchical. A hierarchical set name is a sequence of set names and AS numbers separated by colons ":". At least one component of such a name must be an actual set name (i.e. start with one of the prefixes above). All the set name components of an hierarchical name has to be of the same type. For example, the following names are valid: AS1:AS-CUSTOMERS, AS1:RS-EXPORT:AS2, RS-EXCEPTIONS:RS-BOGUS.

New attributes

The **members** attribute lists the members of the set. E.g. the **`members`** attribute in the **as-set** is a list of AS numbers, or other **as-set** names.

The **`member-of`** attribute describes explicit membership in the **set** objects. It is also an inverse look-up key. It is an optional attribute in **aut-num**, **route** and **inet-rtr** objects.

The **`mbrs-by-ref`** attribute is a list of maintainer names or the keyword ANY. If this attribute is used, the AS set also includes ASes whose **aut-num** objects are registered by one of these maintainers and whose member-of attribute refers to the name of this AS set. If the value of a **`mbrs-by-ref`** attribute is ANY, any AS object referring to the AS set is a member of the set.

14.8 RPS Security

An **as-block** object is needed to delegate a range of AS numbers to a given repository. This is needed for authorisation and it is needed to avoid having to make an exhaustive search of all repositories to find a specific AS.

mnt-routes: The **`mnt-routes`** attribute may appear in an **aut-num**, **inetnum**, or **route** object. This attribute references a **mntner** object which is used in determining authorisation for the addition of **route** objects. After the reference to the **mntner**, an optional list of prefix ranges (as defined in RPSL) inside of curly brackets or the keyword "ANY" may follow. The default, when no additional set items are specified is "ANY" or all more specifics. The **`mnt-routes`** attribute is optional and multiple.

mnt-lower: The **`mnt-lower`** attribute may appear in an **inetnum**, **route**, **as-block** or **aut-num** object. This attribute references a **mntne**r object. When used in an **inetnum** or **route** object, the effect is the same as a "**`mnt-routes`**" but applies only to prefixes more specific than the prefix of the object in which it is contained. In an **as-block** object, **`mnt-lower`** allows addition of more specific **as-block** objects or **aut-num** objects. In an **aut-num** object the **`mnt-lower`** attribute specifies a maintainer that can be used to add objects with hierarchical names.

A **`mnt-routes`** attribute in an **aut-num** object allows addition of **route** objects with that AS number as the origin to the **mntners** listed. A **`mnt-routes`** attribute in an **inetnum** object allows addition of **route** objects with exact matching or more specific prefixes. A **mnt-routes** attribute in a **route** object allows addition of **route** objects with exact matching or more specific prefixes. A **`mnt-routes`** attribute does not allow changes to the **aut-num**, **inetnum**, or **route** object where it appears. A **`mnt-routes`** may optionally be constrained to only apply to a subset of more specific routes.

Where "**`mnt-routes`**" or "**`mnt-lower`**" are applicable, any **mntner** referenced in the "**`mnt-by`**" still apply. The set of applicable **mntners** for whatever check is being made is the union of the "**`mnt-`**

routes" or "**mnt-lower**" and the "**mnt-by**". For example, when authorising a **route** object software would look at "**mnt-routes**", if it does not exist, look at "**mnt-lower**", if that does not exist look at "**mnt-by**".

referral-by: This attribute is required in the **mntner** object. It must never be altered after the addition of the **mntner**. This attribute refers to the **mntner** that created this **mntner**. It may be multiple if more than one signature appeared on the transaction creating the object.

14.9 Tools

IRRToolSet is a suite of policy analysis tools to operate with routing policies in RPSL [RFC 2622] format, registered in the Internet Routing Registry(IRR). The main goal is to make routing information more convenient and useful for network engineers, providing tools for automated router configuration, routing policies analysis and maintenance.

Functionality

- RtConfig - analyses the routing policies registered in the Internet Routing Registry (IRR) and produces router configuration files;
- CIDRAdvisor - suggests safe cidr aggregates (i.e. those that do not violate any policy constraints) that an AS can advertise to each of its neighbouring ASes;
- peval - low level policy evaluation tool that can be used to write router configuration generators;
- prtraceroute - prints the route (with policy information) that packets take to a network host;
- prpath - list all the possible paths between the autonomous system and the specified destination;
- aoe - C++/Tcl/Tk program that displays the aut-num object for specified autonomous system;
- roe - C++/Tcl/Tk program that lists the routes registered by specified autonomous system;
- rpslcheck(prcheck) - syntax-checks the aut-num object for autonomous system registered in the Internet Routing Registry

Special Projects

The **Routing Information Service (RIS)** is a tool to collect routing information between Autonomous Systems (AS), and monitor its development over time. Information collected is available to the RIPE community, for members to improve network operations. Prototype results can be seen at:

http://www.ripe.net/projects/ris/

The **Routing Registry Consistency Check** project (**RRCC**) aims to improve data quality in the Internet Routing Registry by comparing the Routing Registry information with the RIS project results, and prompting LIRs to improve data quality. The Final goal is to improve accessibility and processing capabilities .

http://www.ripe.net/projects/rrcc

References:

RIPE NCC Autonomous System Number Request Form
http://www.ripe.net/ripe/docs/asnrequestform.html

Supporting Notes for the RIPE NCC Autonomous System Number Request Form
http://www.ripe.net/ripe/docs/asnsupport.html

Autonomous System (AS) Number Assignment Policies and Procedures
http://www.ripe.net/ripe/docs/asn-assignment.html

Routing Policy Specification Language (RPSL)
ftp://ftp.ripe.net/rfc/rfc2622.txt

Routing Policy System Security
ftp://ftp.ripe.net/rfc/rfc2725.txt

Internet Routing Registry Toolset Project
http://www.isc.org/index.pl?/sw/IRRToolSet/
http://www.ripe.net/projects/irrtoolset

Routing Registry Consistency Check
http://www.ripe.net/ripe/docs/rr-consistencycheck.html

RFC 2650: Using RPSL in Practice
ftp://ftp.ripe.net/rfc/rfc2650.txt

Routing Registries (Databases) mirrored by the RIPE Database
http://www.ripe.net/db/mirrored.html

RPSL Extensions for 32 Bit AS Numbers
http://iii/twiki/pub/NP/Asn32/draft-uijterwaal-rpsl-4byteas-ext-01.txt

RFC 5396 - Textual Representation of Autonomous System (AS) Numbers
http://www.faqs.org/rfcs/rfc5396.html

RPSL extensions for 32 bit AS Numbers
http://www.ietf.org/internet-drafts/draft-uijterwaal-rpsl-4byteas-ext-01.txt

ASN 32 Bit Test Server
http://www.ripe.net/news/asn-test-server.html

ASN32 Bit Database Update
http://www.ripe.net/news/asn-db-update.html

15. ADDITIONAL ALLOCATION

The first allocation is made automatically by the RIPE NCC with the approved **first** request for address space the LIR submits. This section explains the procedure for requesting an **additional** allocation (made when the addresses previously allocated are used up) and the requirements for receiving a new block of addresses.

Requesting a New Allocation

An LIR can request a new allocation once approximately 80% of all the address space currently allocated to it is used in valid assignments or subalocations:

- assigments (**`inetnum`** objects with '`status`: ASSIGNED PA')
- sub-allocations (**`inetnum`** objects with '`status:` SUB-ALLOCATED PA')

Make the request online via the LIR Portal

Alternatively you can complete ***"IPV4 ADDITIONAL ALLOCATION REQUEST FORM"*** for this purpose.

- The request form should be sent to ***hostmaster@ripe.net*.**

Use the public "**asused**" program to ckeck the utilisation rate of your allocation:

http://www.ripe.net/cgi-bin/webasused.pl.cgi

This is the web version of the public **asused** program. It can be used to run a check on your LIR's allocations in the RIPE database. The output lists information including the following:

- allocations currently held
- total number of addresses in allocation
- total assigned addresses in allocation
- total assigned for infrastructure in allocation
- total unused addresses in allocation and other details of your IP usage

If you submit your Reg-ID, the output of the **asused** program will be sent to the **'e-mail:'** contact listed in our internal registry file about your LIR.

You can also download the asused tool :

ftp://ftp.ripe.net/tools/asused-latest.tar.gz

For more information on how to fill out the ***IPV4 ADDITIONAL ALLOCATION REQUEST FORM*** please refer to the RIPE document ***SUPPORTING NOTES FOR THE IPV4 ADDITIONAL ALLOCATION REQUEST FORM***.

Evaluating a New Allocation Request

The RIPE NCC IP Resource Analysts will check the RIPE NCC internal records and the data stored in the RIPE Database.

All assignments of the previous allocation(s) **must be valid**.

See ***Section 6.6 - Valid and Invalid Assignments*** for a definition of "valid assignments"

Specifically the assignments must be within the LIR's AW or requested from the RIPE NCC.
The records in the RIPE Database must be correct and should not show overlapping assignments.

The RIPE NCC will conduct an audit of the LIR which asks for an additional allocation. In the course of this audit, the RIPE NCC will choose at random and then examine 3 assignments made by the LIR within its Assignment Window (ie assignments for which no approval was needed from the RIPE NCC) The RIPE NCC will examine whether these 3 assignments were made according to the RIPE Policies. For the relevant policies see:

IPv4 Address Allocation and Assignment Policies in the RIPE NCC Service Region
http://www.ripe.net/ripe/docs/ipv4-policies.html

Section 4 Requesting (PA) Address Space, Section 5 Evaluation of Address Space Requests, Section 6 Registering Address Space in the RIPE Database, Section 7 Assignment Window (AW)

Please note that as a result of implementing the ***RIPE Policy Proposal 2009-03***, also known as the ***'Run out Fairly Proposal'*** the Allocation Periods (Planning Periods) will get successively shorter over the course of 2010 and 2011.

	Allocation Period
1 Jan 2010	12 months
1 Jul 2010	9 months
1 Jan 2011	6 months
1 Jul 2011	3 months

Prior to Making New Allocation

LIRs will be asked to correct any inconsistencies of data held by the LIR and that of the RIPE NCC records and RIPE Database. If this process requires significant time, LIRs and the RIPE NCC can agree on a deadline to correct inconsistent data, in order to avoid delaying the new allocation.

An LIR's AW may be lowered by the RIPE NCC to ensure policies and procedures are met.

When data inconsistencies are corrected (or a deadline for corrections is set) and the evaluation process is complete:

- The RIPE NCC will allocate a new block of addresses to the LIR.
- The RIPE NCC will update the RIPE database with the **inetnum** object reflecting the allocation.
- The LIR can announce the new prefix to the Internet.

Closing down an LIR. Reclaiming Internet resources

The RIPE document **Closure of LIR and Deregistration of Internet Number Resources.** *http://www.ripe.net/ripe/docs/ripe-517* discusses the procedures for closing down an LIR and reclaiming their resources.
The document also discusses how certain Internet resources (IP addresses, ASNs etc) can be reclaimed from an LIR without closing the LIR down.

References:

IPv4 Additional Allocation Request Form
http://www.ripe.net/ripe/docs/add-allocation.html

Supporting Notes for the IPv4 Additional Allocation Request Form
http://www.ripe.net/ripe/docs/add-allocation-support.html

IPv4 Address Allocation and Asssignment Policies in the RIPE NCC Service Region
Section 5.3 Policies and Guidelines for Allocations
http://www.ripe.net/ripe/docs/ipv4-policies.html

16. INTRODUCTION TO IPv6

16.1 Overview

The new version of IP addresses is IPv6 with 128 bits. This section describes the format of IPv6 addresses and the allocation policies. More information about IPv6 addresses can be found on the RIPE NCC website at:

http://www.ripe.net/ipv6/

The RIPE IPv6 Working Group also provides useful information. A mailing list is available for participation in IPv6 discussions and the progress of specification and implementation. The IPv6 Working Group web pages can be found on the RIPE NCC website at:

http://www.ripe.net/ripe/wg/ipv6

The current address format of IPv6 is:

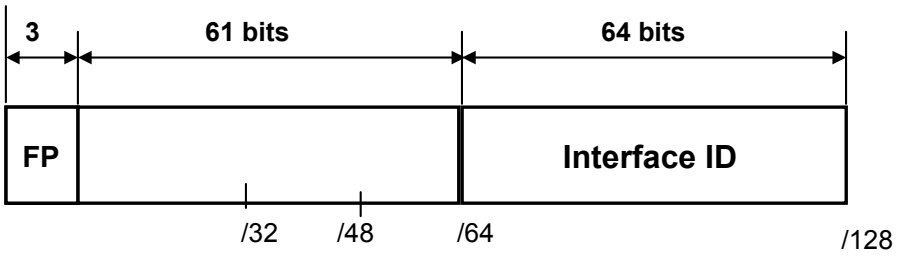


Fig. 16-1 IPv6 address format

For a complete description of LIR policies for allocation and assignment of IPv6 addresses see the ***IPv6 Allocation and Assignment Policy*** document.

16.2 IPv6 Initial Allocation Policies

The general requirements for IPv6 initial allocations are :

Must be an LIR

Must plan to make sub-allocations to other organisations and/or End Site assignments within two years

The default size of an initial allocation is /32

The initial allocation can be larger if justified

To request an initial allocation

- fill out the request form **online** via the **LIR Portal**
- or fill out the ***IPv6 First Allocation Request Form*** and send it to: ***hostmaster@ripe.net*** .

Before making a request please read the ***Supporting Notes for the IPv6 First Allocation Request Form***

After the approval of the request the RIPE NCC IP Resource Analyst will create an **inet6num** object for the initial allocation in the RIPE Database.

16.3 IPv6 Assignments

LIRs do not need to obtain approval from the RIPE NCC for assignments, as long as the sum of all assignments for an End User site is not are not larger than /48.

Assignments sizes are:

/48 in the general case
/64 when it is known that it is only for one subnet
/128 when only one device is connected

for operator's infrastructure:

/48 for PoPs
/48 for in-house operations

Assignments larger more than /48 to an End User site must be approved by the RIPE NCC.

- fill out the request form **online** via the **LIR Portal**
- or fill out the ***IPv6 End User Site Assignment Request Form*** and send it to: ***hostmaster@ripe.net*** .

Before making a request please read the ***Supporting Notes for the IPv6 End User Site Assignment Request Form in***

It is the responsibility of the **LIR to create an inet6num objects for every assignment** (including assignments that did not have to be requested from RIPE NCC) in the RIPE Database.

When an organisation holding an IPv6 address allocation makes IPv6 address assignments, it must register these assignments in the RIPE database.
These registrations can either be made as individual assignments or by inserting a object with a status value of 'AGGREGATED-BY-LIR' where the "assignment-size:" attribute contains the size of the individual assignments made to End Users.When more than a /48 is assigned to an organisation, it must be registered in the database as a separate object with status 'ASSIGNED'.

IPv6 RIPE Database Object

The RIPE database contains an **inet6num** object for IPv6 address allocations and assignments. Below you can find an **inet6num** object that has been created in the RIPE database reflecting the IPv6 allocation made to an LIR by the RIPE NCC:

```
inet6num:     2001:0888::/32
netname:      NL-XS4ALL-20020807
descr:        Provider Local Registry
descr:        Xs4all Internet BV
country:      NL
org:          ORG-PIE1-RIPE # this is just an example
admin-c:      XS42-RIPE
tech-c:       XS42-RIPE
status:       ALLOCATED-BY-RIR
mnt-by:       RIPE-NCC-HM-MNT
mnt-lower:    XS4ALL-MNT
mnt-domains:  XS4ALL-MNT
changed:      hostmaster@ripe.net 20020807
source:       RIPE
```

16.4 IPv6 Subsequent Allocations

The criteria for subsequent allocations are:

- Past address utilisation above threshold (as defined by a HD ratio of 0.8)
- Utilisation based on the number of assigned /48s

For a definition of the HD ratio see the RIPE document ***IPv6 Allocation and Assignment Policy***

I order to reach an HD ratio of 0.8 for a /32 allocation you have to make at least 7132 assignments , each of the size of a /48 (= 10.9% usage)
Additional allocation will be a /32 and contiguous whenever possible.

After the approval of the request the RIPE NCC IP Resource Analyst will create an **inet6num** object for each subsequent allocation in the RIPE Database.

16.5 IPv6 Assignments for IXPs

Note that there are separate request forms for IPv6 assignments to Internet Exchange Points.

Please refer to the RIPE documents ***IPv6 Address Space Policy for Internet Exchange Points*** and ***IPv6 Internet Exchange Points Assignment Request Form.***

To make an IPv6 assignment request for an IXP:

- make the request **online** via the **LIR Portal**
- or send the completed IXP request form to ***hostmaster@ripe.net***

If an End User wants to request an IPv6 Assignment for an IXP, they can do it in two ways:

- Request it from an LIR
- Become a 'Direct Assignment User' and request it directly from the RIPE NCC

For more information on how to become a 'Direct Assignment User' see ***Section 12. Direct Resources*** .

In both cases they have to first sign a so-called End User Assignment Agreement.

- either with the LIR
- or with the RIPE NCC

See ***Section 12. Direct Resources*** . Sample contracts can be found in the References at the end of ***Section 12.***

16.4 IPv6 PI Assignments

To qualify for IPv6 PI address space, an organisation must:

a) demonstrate that it will be multihomed
b) meet the requirements of the policies described in the RIPE NCC document entitled "Contractual Requirements for Provider Independent Resources Holders in the RIPE NCC Service Region"

The RIPE NCC will assign the prefix directly to the End User organisations upon a request properly submitted to the RIPE NCC, either directly or through a sponsoring LIR.

The minimum size of the assignment is a /48. Organisations requesting a larger assignment (shorter prefix) must provide documentation justifying the need for additional subnets.

Additional assignments may also be made when the need is demonstrated and documented based on address usage, or because different routing requirements exist for additional assignments. When possible, these further assignments will be made from an adjacent address block.

Assignments will be made from a separate 'designated block' to facilitate filtering practices.

The PI assignment cannot be further assigned to other organisations.

References:

IPv6 Allocation and Assignment Policy
http://www.ripe.net/ripe/docs/ipv6policy.html

IPv6 First Allocation Request Form in the RIPE NCC Service Region
http://www.ripe.net/ripe/docs/ipv6-initial.html

Supporting Notes for the Initial IPv6 Allocation Request Form in the RIPE NCC Service Region
http://www.ripe.net/ripe/docs/ipv6-supp-initial.html

IPv6 End User Site Assignment Request Form
http://www.ripe.net/ripe/docs/ipv6-assignment-request.html

Supporting Notes for the IPv6 End User Site Assignment Request Form in
http://www.ripe.net/ripe/docs/ipv6-supp-assignment.html

IPv6 Address Space Management
http://www.ripe.net/ripe/docs/ipv6-sparse.html

New Values of the "status:" Attribute for inet6num Objects
http://www.ripe.net/ripe/docs/new-value-status.html

IPv6 Address Space Policy for Internet Exchange Points
http://www.ripe.net/ripe/docs/ipv6-policy-ixp.html

IPv6 Internet Exchange Points Assignment Request Form
http://www.ripe.net/ripe/docs/ipv6request-exchangepoint.html

Supporting notes on The IPv6 Internet Exchange Points Assignment Request Form
http://www.ripe.net/ripe/docs/ripe-372.html

IPv6 Addresses for Internet Root Servers in the RIPE Region
http://www.ripe.net/ripe/docs/ipv6-rootservers.html

Provider Independent (PI) IPv6 Assignments for End User Organisations
http://ripe.net/ripe/policies/proposals/2006-01.html

RIPE IPv6 Working Group
http://www.ripe.net/ripe/wg/ipv6

A Recommendation for IPv6 Address Text Representation
http://tools.ietf.org/html/rfc5952

Requirments for IPv6 in ICT Equipment
http://www.ripe.net/docs/ripe-501.html

17. ADMINISTRATIVE ISSUES

17.1 Audit

To ensure equal and fair application of the assignment criteria and to help LIRs to operate within the criteria, the RIPE NCC performs regular auditing and consistency checking. These activities are carried out consistently with the goals of conservation and registration of address space, and the aggregation of routing information. They are furthermore used as guide for the improvement of current procedures.

Audit Motivation

The Audit Activity is a **service** for LIRs. It was requested by the community that the RIPE NCC should significantly increase its efforts to actively check the quality and validity of registry data and fair distribution of address space. One of the aims is to ensure equal treatment: that all LIRs are applying the global assignment guidelines agreed upon by IANA and the RIPE community to all the End Users equally.

An LIR may also ask to be audited. With the help of the Audit Team, the LIR can:

- Remove database inconsistencies much faster;
- Make the process of gathering the required documentation for requests much easier and more efficient;
- Familiarise themselves with new policies at a rapid pace.

More details can be found in the document ***RIPE NCC CONSISTENCY AND AUDITING ACTIVITY.***

The Audit Process

The Audit Process may be initiated by several factors:

- Infrequent contact with the RIPE NCC.
  Due to the nature of the business or the AW of certain LIRs, they need very little co-ordination from the RIPE NCC. These LIRs are audited from time to time to ensure good working relations and to confirm that they are aware of the latest policies and procedures.

- Random selection.

- Referral by a RIPE NCC IP Resource Analyst.
  If, during the course of normal Registration Services work, a RIPE NCC IP Resource Analyst has difficulty obtaining satisfactory answers from an LIR, the task can be passed on to the Auditing Team.

- External complaints concerning non-compliance with policies and procedures.
  The Audit Team investigates any external complaints, trying to ascertain the validity of the complaints before approaching the LIR in question.

Audit Procedure

In the audit activity, the following information will be looked at:

Database Consistency:

- Is the information stored in the RIPE Database correct and valid?
  - Are the database entries separate, up-to-date and pointing to all individual End User

assignments?

- Is the Database information stored in a correct manner?
  - Are **nic-handles** used?
  - Are **admin-c** and **tech-c** referring to current contact persons?
  - Is the **status** attribute correct?

Assignment Criteria:

- Have all requests above the LIR's AW been sent to the RIPE NCC for approval?

- Is proper documentation regarding the request and the assignment gathered and archived by the LIR ?

- Have the correct assignment policies been followed?

  The documentation will be checked for the following:
  - The completeness of provided documentation
  - The efficiency of IP usage (25% immediate usage and 50% halfway through the" Entire Period")
  - The use of classless assignments.

RIPE NCC Local Records:

- Are contact details complete and up-to-date?

Audit Steps

The initial contact from the auditor is usually done by e-mail. When the LIR responds, the auditor explains the procedure and tries to resolve any possible issues. In some cases, this may result in a temporary lowering of the AW to ensure a correct application and understanding of policies and procedures.

In the event of non-co-operation by the LIR, further action will be taken. This may include lowering an AW, adding mnt-lower to the LIR's allocation, and as a last resort, removing reverse delegation.

17.2 Billing Procedure

LIRs pay an annual fee, which is based on their size. The billing category is assigned on an annual basis. To determine your fee, please refer to the webpage ***RIPE NCC CHARGING SCHEME.2011***

Extra Small:	1300 EUR
Small:	1800 EUR
Medium:	2550 EUR
Large:	4100 EUR
Extra Large:	5500 EUR

There is a one-time start-up fee of 2000 EUR for new LIRs. New LIRs always start in the category "Extra Small".

In addition there is a fixed 50 Euro charge for each Independent Resource (IPv6 and IPv4 PI, AS number, Internet Exchange Point (IXP) and anycasting assignment.)

For more details see the Charging Scheme FAQ page:

http://ripe.net/info/faq/membership/charging-scheme.html

There are several methods of payment: yearly, half-yearly and quarterly. Invoices are sent by ordinary mail and e-mail. Delayed payment will result in reminders being sent:

- The first reminder is sent 30 days after the invoice. No other action is taken at this stage.
- The second reminder is issued after an additional 30 days . Interest on the outstanding invoice is added at the current rate of interest and a late payment charge of 100 EUR is added, too. The LIR enters 'phase 2'. At this stage RIPE NCC will not approve any address space requests including allocations.
- The third reminder follows in another 30 days. If there is still no payment, the LIR enters 'phase 3'. No more services can be obtained from RIPE NCC (service level NONE). Reverse DNS delegations corresponding to the allocation of the LIR are also temporary removed.
- Following this, after yet another 30 days (120 days after the invoice) RIPE starts the procedure of closing down the LIR and taking back the address space (or transferring it to to another LIR). This is 'phase 4'.

Any queries regarding payment and invoices should be addressed to the following mailbox:

billing@ripe.net

> Calculate your LIR's Billing score:
> *http://www.ripe.net/membership/billing/calculation.html*

17.3 Closing / Merging / Taking-over an LIR

There are several possible scenarios where an LIR is closed or taken over by another LIR:

1. An LIR closes completely;
2. One LIR takes over another LIR and the other closes;
3. A LIR takes over another LIR and both remain open;
4. A Non-LIR takes over an LIR

The above mentioned situations are fairly rare and are therefore handled on a case-by-case basis. It is therefore very important to contact the RIPE NCC for details about exact procedures. This should be done via e-mail to:

lir-help@ripe.net

Issues that need to be resolved are, among others, the following:

- Billing issues;
- Administrative issues:
  - Contact persons
  - Address and phone number changes
- Address space issues;
  - Invalid objects in the RIPE DB
  - Return of the renumbered networks
  - AW considerations
- Authority of allocations and reverse zones;
  - New / old **mntner** objects
- (Small) Database changes.

New contracts may have to be signed between the RIPE NCC and the parties involved. New contact persons may need to be confirmed.

There is **no need to change the RegID** if the ownership or name of an LIR changes.

If an LIR wants to **change their Reg-ID**, they must pay a **start-up fee**, just like for establishing a new LIR. (To cover administrative costs)

LIRs must pay a one-time "**take-over fee**" of 1250 EUR if they take over the address space (allocations) of another LIR as a result of a merger.

If there is a change of the LIR's name, the registration documentation from the relevant Chamber of Commerce or its country equivalent supporting the name change must be submitted to the RIPE NCC by fax.

For more details see:
MERGERS, ACQUISITIONS AND CLOSURES OF ORGANISATIONS OPERATING AN LIR

It is also possible to transfer IPv4 resources between LIRs. For more details see:
ENABLING METHODS FOR REALLOCATION OF IPV4 RESOURCES

References:

RIPE NCC CONSISTENCY AND AUDITING ACTIVITY
http://www.ripe.net/ripe/docs/ripe-170.html

AUDIT ACTIVITY
http://www.ripe.net/ripencc/mem-services/registration/audit/index.html

RIPE NCC ACTIVITY PLAN 2011
http://www.ripe.net/ripe/docs/ap.html

RIPE NCC BILLING PROCEDURE AND FEE SCHEDULE 2011
http://www.ripe.net/membership/billing/procedure.html

CALCULATING YOUR LIR'S BILLING SCORE
http://www.ripe.net/membership/billing/calculation.html

RIPE NCC CHARGING SCHEME 2011
http://www.ripe.net/ripe/docs/charging.html

http://ripe.net/info/faq/membership/charging-scheme.html

RIPE NCC BUDGET 2011
http://www.ripe.net/ripe/docs/budget.html

MERGERS, ACQUISITIONS AND CLOSURES OF ORGANISATIONS OPERATING AN LIR
http://www.ripe.net/ripe/docs/mergers.html

ENABLING METHODS FOR REALLOCATION OF IPV4 RESOURCES
http://ripe.net/ripe/policies/proposals/2007-08.html

18. ADVANCED COURSES

18.1 General Information

As service to its members the RIPE NCC offers the “Routing Registry Training Course” and the “DNS for LIRs Training Course”.

Registration

In order to register for either of these two Training Courses one must be an employee of an LIR and either:
- be an LIR contact
- be confirmed by an LIR contact.

LIR contacts are those employees of an LIR who are registered with RIPE NCC as authoritative contact persons.
It is expected that most of those interested in these advanced training courses will not be authorative contact persons for their LIR, and will therefore be refused by the course registration robot. In order to be admitted to the course, a confirmation e-mail needs to be sent in reply, signed by one of the authorative contact persons, to ***training@ripe.net*** . Please approach the “LIR contacts” in your organisation personally, since the identity of LIR contacts is confidential, and the RIPE NCC is unable to divulge contact persons for any given LIR.
Please note that we accept no more than **two** people per LIR for any training course at any given time. If more then two persons from the same LIR apply, they will be placed on the waiting list and only admitted to the course in the case of possible free places.
More details on the training course policies are available in the RIPE NCC Local IR Training Policies document.

See a list of forthcoming courses at: *http://www.ripe.net/cgi-bin/courselist.cgi*
Online registration: *http://www.ripe.net/cgi-bin/trainingform.cgi*

Or via the LIR Portal

For more information also refer to the Training webpage of the RIPE NCC:

http://www.ripe.net/training/

18.2 Routing Registry Training Course

Course Objectives

The main objective of the Routing Registry Training Course is to familiarise LIRs with the features of the Routing Registry and the related tools, introduce relevant services of the RIPE NCC, and explain basics of the Routing Policy Specification Language (RPSL). This is done through presentation, demonstration of tools, and interactive practical exercises.

Scope

Routing Registry as a part of the RIPE Database and the Internet Routing Registry (IRR)
Specifying routing policies using RPSL and the RtConfig
IRRToolSet
Routing Information Service (RIS)
Routing Registry Consistency Check (RRCC)

The course does NOT cover:
basics of routing, nor any technical routing topics

basics of the RIPE Database operations
how to receive Internet resources from the RIPE NCC
how to operate an Local Internet Registry (LIR)

Target Audience

The target audience of the Routing Registry Training course is technical staff of Local Internet Registries, e.g. network operators, engineers etc. This course is not intended for administrative or management staff (e.g. Hostmasters).
It is assumed that all attendees will be familiar with BGP routing and with the basics of the RIPE Database operations (creating/modifying objects).

18.3 IPv6 for LIRs Training Course

Course Objectives

The main objective of the IPv6 Training Course is to provide LIRs with information about the need for IPv6 and give information on how to plan deployment. It covers current policies related to IPv6 and how to obtain IPv6 address space.

Please note: The IPv6 course focuses on raising awareness of the need for IPv6 and current best practices for deploying IPv6.

The course does:

* NOT teach the technical details of IPv6
* NOT describe how to configure routers, servers or other devices for IPv6
* NOT describe how to operate a Local Internet Registry (LIR)

Target Audience

The IPv6 Training Course is intended for staff of LIRs that:

* are thinking about deploying IPv6
* have been told they need to deploy IPv6
* need to convince their boss that IPv6 needs to be deployed
* looked at an IPv6 address and thought it was too complicated

It is assumed all attendees are familiar with common IP terminology and have practical knowledge of running an IP network.

References:

RIPE NCC TRAINING REGISTRATION GUIDELINES
http://www.ripe.net/ripe/docs/lir-training.html

19. RIPE NCC E-LEARNING CENTRE

The RIPE NCC E-Learning Centre is a service is available to both members and non-members of the RIPE NCC and enables users to learn in their own space at their own pace:

https://www.ripe.net/lir-services/training/e-learning

Modules available currently are

- RIPE Database
    - an introduction to creating and updating basic Database objects
    - using PGP keys and X509 cerificates in mntner objects
- Internet Administration
    - a short history of Regional Internet Registries (RIRs) and of the Number Resource Organization
    - Number Resource Organisation
- Policy Development
    - The RIPE Policy development process

In the future the RIPE NCC will be adding several modules such as: DNS for LIRs, Advanced Database Issues and the billing/charging scheme.

To take any of the courses on the E-Learning Centre, you will first need to register an account.

If you have any questions or feedback about the RIPE NCC E-Learning Centre, please e-mail:

e-learning@ripe.net

References:

RIPE NCC E-LEARNING CENTRE
https://www.ripe.net/lir-services/training/e-learning

APPENDICES:

Appendix 1: Contact E-mail Addresses

role mail-accounts		Description
Ncc@ripe.net		Catch-all mailbox for questions that are not handled by any specific role-mailbox. The people handling this mailbox will redirect your message to the appropriate person or department.
Billing@ripe.net		Handles all billing-related questions from Local Internet Registries.
New-lir@ripe.net		Handles all questions related to the setting up of new Local Internet Registries.
Training@ripe.net		Questions related to Local IR training courses and matters with regards to registration, venues, vacancy of slots for LIR courses.
Peerings@ripe.net		The contact point for inter AS peerings at the RIPE NCC.
Openings@ripe.net		Please send your CVs and all job applications here.
Webmaster@ripe.net		Questions concerning the RIPE NCC web site.
Chair@ripe.net		RIPE chair and co-chairs.
Meeting@ripe.net		Questions related to RIPE Meetings (where WG chairs send their minutes / updates), and registration for RIPE Meetings.

@ripe.net	Type	Requires	Keywords	Answers	Description
Hostmaster	Robot/Human	- Reg-ID - Ticket number - Signature of the LIR contact person	NOAUTO NEW LONGACK	ACK REMARK WARNING ERROR	IP and AS requests; syntax check
Lir-help	Human	- Reg-ID - Ticket number - Signature of the LIR contact person			Miscellaneous LIR questions: • merging • updating allocation objects with contact persons or hierarchical authorisation • updating reg file
Ncc-services-wg	Mailman' list	Open			Discussion of RIPE NCC services
Address-policy-wg	Mailman' list	Open			An open forum where RIPE address policy is made that affects address and ASN allocations.
Ncc-announce	Closed list	Registered in the "Reg" file			Announcements from RIPE NCC to LIRs
Auto-dbm Test-dbm	Robot		NEW	ACK WARNING ERROR	RIPE Database interfaces
Ripe-dbm	Human				DB related questions
Db-wg	'Mailman' list	Open			RIPE DB requirements
Db-help	'Mailman' list	Open			Basic DB questions
lirportal	'Mailman' list				Feedback about LIR Portal

Appendix 2: List of RIPE Documents

THE MOST IMPORTANT RIPE DOCUMENTS FOR DAY-TO-DAY OPERATIONS OF LIRS:
See also*:* *http://www.ripe.net/ripe/docs/internet-registries.html*

IPv4 address space

IPV4 ADDRESS ALLOCATION AND ASSIGNMENT POLICIES IN THE RIPE NCC SERVICE REGION
http://www.ripe.net/ripe/docs/ipv4-policies.html

PROVIDER AGGREGATABLE (PA) ASSIGNMENT REQUEST FORM
http://www.ripe.net/ripe/docs/iprequestform.html

SUPPORTING NOTES FOR THE PROVIDER AGGREGATABLE (PA) ASSIGNMENT REQUEST FORM
http*://www.ripe.net/ripe/docs/iprequestsupport.html*

IPV4 FIRST ALLOCATION REQUEST FORM
http://www.ripe.net/ripe/docs/first-allocation.html

SUPPORTING NOTES FOR THE IPV4 FIRST ALLOCATION REQUEST FORM
http://www.ripe.net/ripe/docs/first-allocation-support.html

IPV4 ADDITIONAL ALLOCATION REQUEST FORM
http://www.ripe.net/ripe/docs/add-allocation.html

ADDRESS SPACE MANAGED BY THE RI PE NCC
https://www.ripe.net/ripe/docs/ripe-ncc-managed-address-space.html

RUN OUT FAIRLY PROPOSAL 2009-03
http://ripe.net/ripe/policies/proposals/2009-03.html

RIPE Database

RIPE NCC DATABASE REFERENCE MANUAL
http://www.ripe.net/ripe/docs/databaseref-manual.html

RIPE NCC DATABASE USER MANUAL: GETTING STARTED
http://www.ripe.net/ripe/docs/db-start.html

RIPE DATABASE QUERIES REFERENCE CARD
http://www.ripe.net/db/support/whois-refcard.pdf

RIPE DATABASE TERMS AND CONDITIONS
http://ripe.net/ripe/docs/terms-conditions.html

NEW VALUES OF THE "STATUS:" ATTRIBUTE FOR INETNUM OBJECTS (LIR-PARTITIONED)
http://www.ripe.net/ripe/docs/lir-partitioned.html

IRT OBJECT IN THE RIPE DATABASE
http://www.ripe.net/ripe/docs/irt-object.html

Reverse Delegation

POLICY FOR REVERSE DELEGATION UNDER in-addr.arpa IN THE RIPE NCC SERVICE REGION
http://www.ripe.net/ripe/docs/rev-del.html

IPv6 Address Space

IPv6 Allocation and Assignment Policy
http://www.ripe.net/ripe/docs/ipv6policy.html

IPv6 Address Space Management
http://www.ripe.net/ripe/docs/ipv6-sparse.html

IPv6 First Allocation Request Form
http://www.ripe.net/ripe/docs/ipv6-initial.html

Supporting Notes for the IPv6 First Allocation Request Form
http://www.ripe.net/ripe/docs/ipv6-supp-initial.html

IPv6 End User Site Assignment Request Form
http://www.ripe.net/ripe/docs/ipv6-assignment-request.html

Supporting Notes for the IPv6 End User Site Assignment Request Form
http://www.ripe.net/ripe/docs/ipv6-supp-assignment.html

New Values of the "status:" Attribute for inet6num Objects
http://www.ripe.net/ripe/docs/new-value-status.html

IPv6 Addresses for Internet Root Servers in the RIPE Region
http://www.ripe.net/ripe/docs/ipv6-rootservers.html

IPv6 Address Space Policy for Internet Exchange Points
http://www.ripe.net/ripe/docs/ipv6-policy-ixp.html

IPv6 Internet Exchange Points Assignment Request Form
http://www.ripe.net/ripe/docs/ipv6request-exchangepoint.html

A Recommendation for IPv6 Address Text Representation
http://tools.ietf.org/html/rfc5952

Requirments for IPv6 in ICT Equipment
http://www.ripe.net/docs/ripe-501.html

Autonomous System Numbers

AS Number Request Form
http://www.ripe.net/ripe/docs/asnrequestform.html

Supporting Notes for the Autonomous System Number Request Form
http://www.ripe.net/ripe/docs/asnsupport.html

Autonomous System (AS) Number Assignment Policies and Procedures
http://www.ripe.net/ripe/docs/asn-assignment.html

RPSL Extensions for 32 Bit AS Numbers
http://iii/twiki/pub/NP/Asn32/draft-uijterwaal-rpsl-4byteas-ext-01.txt

RFC 5396 - Textual Representation of Autonomous System (AS) Numbers
http://www.faqs.org/rfcs/rfc5396.html

RPSL EXTENSIONS FOR 32 BIT AS NUMBERS
http://www.ietf.org/internet-drafts/draft-uijterwaal-rpsl-4byteas-ext-01.txt

ASN 32 BIT TEST SERVER
http://www.ripe.net/news/asn-test-server.html

ASN32 BIT DATABASE UPDATE
http://www.ripe.net/news/asn-db-update.html

Administrative

NEW MEMBERS' DOCUMENTATION
http://www.ripe.net/membership/new-members

MERGERS, ACQUISITIONS, TAKEOVERS AND CLOSURES ORGANISATIONS OPERATING AN LIR
http://www.ripe.net/ripe/docs/mergers.html

RIPE NCC ACTIVITY PLAN 2011
http://www.ripe.net/ripe/docs/ap.html

RIPE NCC BILLING PROCEDURE AND FEE SCHEDULE 2011
http://www.ripe.net/membership/billing/procedure.html

RIPE NCC CHARGING SCHEME 2011
http://www.ripe.net/ripe/docs/charging.html

CALCULATING YOUR LIR'S BILLING SCORE
http://www.ripe.net/membership/billing/calculation.html

RIPE NCC BUDGET 2011
http://www.ripe.net/ripe/docs/budget.html

RIPE NCC ANNUAL REPORTS
http://www.ripe.net/info/ncc/ar.html

POLICY DEVELOPMENT PROCESS IN RIPE
https://www.ripe.net/ripe/docs/pdp.html

Appendix 3: Bit Boundaries Chart

/16 0-255
/ \
/17 0-127 128-255
/ \ / \
/18 0-63 64-127 128-191 192-255
/ \ / \ / \ / \
/19 0-31 32-63 64-95 96-127 128-159 160-191 192-223 224-255

/20
0-15 16-31 32-47 48-63 64-79 80-95 96-111 112-127 128-143 144-159
160-175 176-191 192-207 208-223 224-239 240-255

/21
0-7 8-15 16-23 24-31 32-39 40-47 48-55 56-63 64-71 72-79 80-87 88-95
96-103 104-111 112-119 120-127 128-135 136-143 144-151 152-159 160-167
168-175 176-183 184-191 192-199 200-207 208-215 216-223 224-231
232-239 240-247 248-255

/22
0-3 4-7 8-11 12-15 16-19 20-23 24-27 28-31 32-35 36-39 40-43 44-47
48-51 52-55 56-59 60-63 64-67 68-71 72-75 76-79 80-83 84-87 88-91
92-95 96-99 100-103 104-107 108-111 112-115 116-119 120-123 124-127
128-131 132-135 136-139 140-143 144-147 148-151 152-155 156-159
160-163 164-167 168-171 172-175 176-179 180-183 184-187 188-191
192-195 196-199 200-203 204-207 208-211 212-215 216-219 220-223
224-227 228-231 232-235 236-239 240-243 244-247 248-251 252-255

/23
0-1 2-3 4-5 6-7 8-9 10-11 12-13 14-15 16-17 18-19 20-21 22-23 24-25
26-27 28-29 30-31 32-33 34-35 36-37 38-39 40-41 42-43 44-45 46-47
48-49 50-51 52-53 54-55 56-57 58-59 60-61 62-63 64-65 66-67 68-69
70-71 72-73 74-75 76-77 78-79 80-81 82-83 84-85 86-87 88-89 90-91
92-93 94-95 96-97 98-99 100-101 etc...

/24
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69
70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91
92 93 94 95 96 97 98 99 100 101 etc...

Appendix 4: List of Acronyms

AfriNIC	African Regional Internet Registry Network Information Centre
APNIC	Asia Pacific Network Information Centre
APRICOT	Asia Pacific Regional Internet Conference on Operational Technology
ARIN	American Registry for Internet Numbers
ARPANET	Advanced Research Projects Agency Network
AS	Autonomous System
ASN	Autonomous System Number
ASO	Address Supporting Organisation
AW	Assignment Window
ccTLD	country code Top Level Domain
CENTR	Council of European National Top-level domain Registries
DISI	Deployment of Internet Security Infrastructure
DNR	Domain Name Registration
DNS	Domain Name System
EOF	European Operators Forum
EIX	European Internet Exchange
GM	General Meeting
gTLD	generic Top Level Domain
IANA	Internet Assigned Numbers Authority
ICANN	Internet Corporation for Assigned Names and Numbers
IEPG	Internet Engineering and Planning Group
IETF	Internet Engineering Task Force
INET	Internet Society's annual conference
IP	Internet Protocol
IRT	Incident Response Team
ISP	Internet Service Provider
IXP	Internet Exchange Point
LACNIC	Latin American and Caribbean Network Information Centre
LIR	Local Internet Registry
NANOG	North American Network Operating Group
NIKHEF	National Institute for Nuclear and High Energy Physics (translated from Dutch)
PGP	Pretty Good Privacy
POP	Post Office Protocol (or Point of Presence)
PPP	Point-to-Point Protocol
PRIDE	Policy Based Routing Implementation and Development in Europe
RA(P)	Router Arbiter (Project)
RADB	Routing Arbiter Database
RARE	Réseaux Associés pour la Recherche Européenne
RIPE	Réseaux IP Européens
RIPE NCC	RIPE Network Coordination Centre
RIR	Regional Internet Registry
RIS	Routing Information Service
RPSL	Routing Policy Specification Language
RR	Routing Registry (in DNS: Resource Record)
RS	Registration Services
TERENA	Trans European Research and Education Networking Association
TLD	Top Level Domain
TS	Training Services
TT	Test Traffic
TTM	Test Traffic Measurements
WG	Working Group

Appendix 5: RIPE NCC Glossary

ASO Address Council (AC)
- Manages the business functions of the Address Supporting Organisation (ASO), including the development of policy in accordance with the guidelines defined by the Memorandum of Understanding (MoU).

Africa Network Operator's Group (AFNOG) http://www.afnog.org/
- A forum for the exchange of technical information. Aims to promote discussion of implementation issues that require community cooperation in the African region.

African Network Information Center (AfriNIC) http://www.afrinic.net/
- A Regional Internet Registry (RIR) serving the African region proposed by the African community for the purpose of managing IP addressing in the continent.

Aggregation
- One of the main goals of Internet administration. Aggregation refers to the distribution of public Internet addresses in a hierarchical manner, permitting the "summarisation" (or aggregation) of routing information and limiting the number of routing entries advertised in the Internet.

Allocation
- Refers to the range of addresses made available to a Local Internet Registry (LIR) that in turn is used by the LIR to make address space assignments to End Users or to the LIR's own network.

American Registry for Internet Numbers (ARIN) http://www.arin.net
- A Regional Internet Registry (RIR) serving North America and African countries located south of the equator.

Asia Pacific Networking Group (APNG) http://www.apng.org/
- An Internet organisation that aims to promote the Internet and the coordination of network inter-connectivity in the Asia Pacific region.

Asia Pacific Network Information Centre (APNIC) http://www.apnic.net
- A Regional Internet Registry (RIR) serving the Asia Pacific region.

Asia Pacific Regional Internet Conference on Operational Technologies (APRICOT)
http://www.apricot.net/
- Providing a forum for key Internet builders in the region to learn from their peers and other leaders in the Internet community from around the world.

Assignment
- Refers to address space that a Local Internet Registry (LIR) distributes to an End User / organisation that will use the addresses to operate their specific network(s).

Assignment Window (AW)
- Refers to the maximum number of addresses that can be assigned by a Local Internet Registry (LIR) to an End User / organisation, or for their own infrastructure, without prior approval by the RIR Hostmasters.

Autonomous System (AS)
- A group of IP networks operated by one or more network operators that has a single and clearly defined external routing policy.

Autonomous System Number (ASN)
- A globally unique number associated with an Autonomous System (AS) that is used both in exchange of exterior routing information and as an identifier of the AS itself.

Birds of a Feather (BoF)
- Group discussions on topics of specialised interest.

Border Gateway Protocol (BGP)
- An Internet protocol commonly used within and between Internet Service Providers (ISPs) that enables groups of routers (Autonomous Systems) to share routing information so that efficient, loop-free routes can be established.

Classful
- The architecture used on the Internet until 1993 that allowed an IP address to be segmented in a variety of ways to provide three classes of network addresses.

Classless Interdomain Routing (CIDR)
- A scheme which allocates blocks of Internet addresses in a way that allows summarisation into a smaller number of routing table entries**.**

country code Top Level Domain (ccTLD)
- A Top Level Domain (TLD) corresponding to a country, territory, or other geographic location.

Domain Name System (DNS)
- A distributed database of information used to translate domain names into IP numbers.

DNS Security (DNSSec)
- A set of extensions that provides Domain Name System (DNS) data integrity and authentication through the use of cryptographic digital signatures.

End User
- An entity receiving assignments of IP addresses exclusively for use in operational networks, not for reassignment to other organisations.

ENUM
- (RFC 3761) The Internet Engineering Task Force (IETF) protocol. It is the mapping of an E.164 telephone number to Internet services.

European Operators Forum (EOF)
- A forum where new technology developments of interest to Internet Protocol network operators are presented and discussed. The EOF is held in conjunction with RIPE Meetings.

General Packet Radio Service (GPRS)
- A service that allows information to be sent and received across a mobile telephone network.

generic Top Level Domain (gTLD)
- An internationally allocated portion of namespace.

in-addr.arpa
- An abbreviation for inverse addresses in the Address and Routing Parameter Area used for tracing source servers.

Internet Architecture Board (IAB) http://www.iab.org/
- A technical advisory group of the Internet Society (ISOC).

Internet Assigned Numbers Authority (IANA) http://www.iana.org
- The organisation, working under the auspices of the Internet Architecture Board (IAB), responsible for the management of IP address space allocation and functions involving domain names.

Internet Corporation for Assigned Names and Numbers (ICANN) http://www.icann.org
- The not-for-profit organisation responsible for, among other duties, distributing IP address space to the RIRs for allocation to member organisations.

ICANN Address Supporting Organisation (ASO) http://www.aso.icann.org/
- One of the Supporting Organisations called for in the ICANN Bylaws to be "formed through community consensus". The purpose of the ASO is to review and develop recommendations on IP address policy and to advise the ICANN Board on these matters.

ICANN ASO Memorandum of Understanding (ASO MoU)
- Establishing a set of principles that ICANN and the Regional Internet Registries (RIRs) that have signed the memorandum will use in forming and operating the ASO.

Internet Engineering Task Force (IETF) http://www.ietf.org/
- A community of network designers, operators, vendors and researchers involved in the Internet.

Internet Exchange Point (IXP)
- A "meeting place" for ISPs where local traffic can be exchanged without having to pass over costly, slower international links.

Internet Protocol (IP)
- The method (or protocol) by which data is sent from one computer to another on the Internet.

IP Address
- An individual number assigned to a particular host that uniquely identifies that host, much like a telephone number uniquely identifies a person, family, business, or location.

ip6.arpa
- The equivalent reverse tree for IPv6 delegations. See “in-addr.arpa”.

Internet Protocol version 4 (**IPv4)**
- A method of identifying IP numbers as 32-bit addresses that consist of four octets; each octet is expressed as a number between 0 and 255.

Internet Protocol version 6 (**IPv6)**
- A method of identifying IP numbers as 128-bit addresses in eight 16-bit pieces using hexadecimal values.

Internet Routing Registry (IRR)
- A collection of worldwide routing policy databases that use the Routing Policy Specification Language (RPSL).

Internet Service Provider (ISP)
- A person, organisation, or company that provides access to the Internet as well as web hosting, domain name service, and other proprietary Internet services.

Internet Society (ISOC) http://www.isoc.org/
- A non-profit organisation responsible for developing and approving new Internet standards and protocols.

Latin American and Caribbean Internet Addresses Registry (LACNIC) http://www.lacnic.net
- A Regional Internet Registry (RIR) serving the Latin America and Caribbean region.

Local Internet Registry (LIR)
- A member of a Regional Internet Registry (RIR) that distributes IP addresses and Autonomous System Numbers to End Users and for its own infrastructure.

Multihomed
- An adjective used to describe a host that is connected to two or more networks or has two or more network addresses.

NIC handle (nic-hdl)
- A person or role object within a database that is a unique person identifier and that references contact details for a specific person or team.

North American Network Operators Group (NANOG) http://www.nanog.org/
- A North American forum for the co-ordination and dissemination of technical information related to backbone / enterprise networking technologies and operational practices.

Number Resource Organization (NRO) http://www.nro.net/
- Serving as the coordinating mechanism of the Regional Internet Registries (RIRs) to act collectively on matters relating to the interests of the RIRs.

Regional Internet Registry (RIR)
- Not-for-profit organisations established under the authority of the Internet Assigned Numbers Authority (IANA) that operate in large geopolitical regions such as continents. Responsible for the coordination and representation of Internet Registries, allocation and assignment of IPv4 and IPv6 address space, Autonomous System Numbers and maintenance of public databases.

Request for Comment (RFC)
- A document series of the Internet Engineering Task Force (IETF) that focuses on computing concepts, computer communications, networking, and Internet protocols.

Réseaux IP Européens (RIPE)
- A collaborative forum open to all parties interested in wide area IP networks. The objective of RIPE is to ensure the administrative and technical coordination necessary to enable the operation of the Internet within the RIPE region.

Reverse Delegation
- The mapping of IP addresses to domain names under the domain "in-addr.arpa" and “ip6.arpa” (Address and Routing Parameter Area).

RIPE Database
- A public Whois database that contains information about allocations and assignments of IP address space, Internet routing, and related objects in the RIPE region.

RIPE Network Coordination Centre (RIPE NCC) http://www.ripe.net
- A Regional Internet Registry (RIR) serving Europe, the Middle East, and African countries located north of the equator.

RIPE NCC LIR Portal https://lirportal.ripe.net/
- The secure web interface that provides RIPE NCC members the ability to request and view Internet resources allocated to them by the RIPE NCC.

Routability
- A block of addresses being identified as a separate entity in the routing tables and is therefore reachable in the Internet.

Routing Policy
- A set of agreements on the traffic routed through multiple Internet Service Provider (ISP) networks determined by those ISPs.

Routing Registry
- A public database of routing policy details, routes and their aggregates, local topology between Autonomous Systems, and network components such as routers.

South Asian Network Operators Group (SANOG) http://www.sanog.org/
- A regional forum to discuss operational issues and technologies of interest to data operators in the South Asian Region.

Universal Mobile Telecommunications System (UMTS)
- A 3G mobile technology delivering broadband information at speeds up to 2Mbit/s.

WG (Working Group)
- Organisational units formed by the RIR communities where discussions take place ranging from technical matters such as Domain Name System (DNS), routing and databases, to policy issues affecting Internet administration such as IP assignments and allocation policies.

Whois Database
- A general term for a database that uses Whois protocol for queries, e.g. the RIPE Database.

Appendix 6: Object Templates in the RIPE Database

PERSON

```
person:         [mandatory]  [single]     [lookup key]
address:        [mandatory]  [multiple]   [ ]
org:            [optional]   [single]     [inverse key]
phone:          [mandatory]  [multiple]   [ ]
fax-no:         [optional]   [multiple]   [ ]
e-mail:         [optional]   [multiple]   [lookup key]
abuse-mailbox:  [optional]   [multiple]   [lookup key]
nic-hdl:        [mandatory]  [single]     [primary/look-up key]
remarks:        [optional]   [multiple]   [ ]
notify:         [optional]   [multiple]   [inverse key]
mnt-by:         [mandatory]  [multiple]   [inverse key]
changed:        [mandatory]  [multiple]   [ ]
source:         [mandatory]  [single]     [ ]
```

ROLE

```
role:           [mandatory]  [single]     [lookup key]
address:        [mandatory]  [multiple]   [ ]
org:            [optional]   [single]     [inverse key]
phone:          [optional]   [multiple]   [ ]
fax-no:         [optional]   [multiple]   [ ]
e-mail:         [mandatory]  [multiple]   [lookup key]
abuse-mailbox:  [optional]   [multiple]   [lookup key]
admin-c:        [mandatory]  [multiple]   [inverse key]
tech-c:         [mandatory]  [multiple]   [inverse key]
nic-hdl:        [mandatory]  [single]     [primary/look-up key]
remarks:        [optional]   [multiple]   [ ]
notify:         [optional]   [multiple]   [inverse key]
mnt-by:         [mandatory]   [multiple]   [inverse key]
changed:        [mandatory]  [multiple]   [ ]
source:         [mandatory]  [single]     [ ]
```

INETNUM (NETWORK)

```
inetnum:        [mandatory]  [single]     [primary/look-up key]
netname:        [mandatory]  [single]     [lookup key]
descr:          [mandatory]  [multiple]   [ ]
country:        [mandatory]  [multiple]   [ ]
org:            [optional]   [single]     [inverse key]
admin-c:        [mandatory]  [multiple]   [inverse key]
tech-c:         [mandatory]  [multiple]   [inverse key]
rev-srv:        [optional]   [multiple]   [inverse key]
status:         [mandatory]  [single]     [ ]
remarks:        [optional]   [multiple]   [ ]
notify:         [optional]   [multiple]   [inverse key]
mnt-by:         [mandatory]  [multiple]   [inverse key]
mnt-lower:      [optional]   [multiple]   [inverse key]
mnt-routes:     [optional]   [multiple]     [inverse key]
mnt-irt:        [optional]   [multiple]   [inverse key]
mnt-domains:    [optional]   [multiple]   [inverse key]
changed:        [mandatory]  [multiple]   [ ]
source:         [mandatory]  [single]     [ ]
```

MNTNER

```
mntner:         [mandatory]  [single]     [primary/look-up key]
descr:          [mandatory]  [multiple]   [ ]
org:            [optional]   [single]     [inverse key]
admin-c:        [mandatory]  [multiple]   [inverse key]
tech-c:         [optional]   [multiple]   [inverse key]
abuse-mailbox:  [optional]   [multiple]   [lookup key]
upd-to:         [mandatory]  [multiple]   [inverse key]
mnt-nfy:        [optional]   [multiple]   [inverse key]
auth:           [mandatory]  [multiple]   [inverse key]
remarks:        [optional]   [multiple]   [ ]
notify:         [optional]   [multiple]   [inverse key]
mnt-by:         [mandatory]  [multiple]   [inverse key]
auth-override:  [optional]   [single]     [ ]
referral-by:    [mandatory]  [single]     [inverse key]
changed:        [mandatory]  [multiple]   [ ]
source:         [mandatory]  [single]     [ ]
```

IRT

```
irt:            [mandatory]  [single]     [primary/lookup key]
remarks:        [optional]   [multiple]   [ ]
address:        [mandatory]  [multiple]   [ ]
org:            [optional]   [single]     [inverse key]
phone:          [optional]   [multiple]   [ ]
fax-no:         [optional]   [multiple]   [ ]
e-mail:         [mandatory]  [multiple]   [lookup key]
abuse-mailbox:  [optional]   [multiple]   [lookup key]
signature:      [optional]   [multiple]   [ ]
encryption:     [optional]   [multiple]   [ ]
admin-c:        [mandatory]  [multiple]   [inverse key]
tech-c:         [mandatory]  [multiple]   [inverse key]
auth:           [mandatory]  [multiple]   [inverse key]
irt-nfy:        [optional]   [multiple]   [inverse key]
notify:         [optional]   [multiple]   [inverse key]
mnt-by:         [mandatory]  [multiple]   [inverse key]
changed:        [mandatory]  [multiple]   [ ]
source:         [mandatory]  [single]     [ ]
```

ROUTE

```
route:          [mandatory]  [single]     [primary/look-up key]
descr:          [mandatory]  [multiple]   [ ]
org:            [optional]   [single]     [inverse key]
origin:         [mandatory]  [single]     [primary/inverse key]
holes:          [optional]   [multiple]   [ ]
member-of:      [optional]   [multiple]   [inverse key]
inject:         [optional]   [multiple]   [ ]
aggr-mtd:       [optional]   [single]     [ ]
aggr-bndry:     [optional]   [single]     [ ]
export-comps:   [optional]   [single]     [ ]
components:     [optional]   [single]     [ ]
remarks:        [optional]   [multiple]   [ ]
cross-mnt:      [optional]   [multiple]   [inverse key]
cross-nfy:      [optional]   [multiple]   [inverse key]
notify:         [optional]   [multiple]   [inverse key]
mnt-lower:      [optional]   [multiple]   [inverse key]
mnt-routes:     [optional]   [multiple]   [inverse key]
mnt-by:         [mandatory]  [multiple]   [inverse key]
changed:        [mandatory]  [multiple]   [ ]
source:         [mandatory]  [single]     [ ]
```

DOMAIN

```
domain:         [mandatory]  [single]     [primary/look-up key]
descr:          [mandatory]  [multiple]   [ ]
org:            [optional]   [single]     [inverse key]
admin-c:        [mandatory]  [multiple]   [inverse key]
tech-c:         [mandatory]  [multiple]   [inverse key]
zone-c:         [mandatory]  [multiple]   [inverse key]
nserver:        [optional]   [multiple]   [inverse key]
ds-rdata:       [optional]   [multiple]   [inverse key]
sub-dom:        [optional]   [multiple]   [inverse key]
dom-net:        [optional]   [multiple]   [ ]
remarks:        [optional]   [multiple]   [ ]
notify:         [optional]   [multiple]   [inverse key]
mnt-by:         [mandatory]  [multiple]   [inverse key]
mnt-lower:      [optional]   [multiple]   [inverse key]
refer:          [optional]   [single]     [ ]
changed:        [mandatory]  [multiple]   [ ]
source:         [mandatory]  [single]     [ ]
```

AUT-NUM

```
aut-num:        [mandatory]  [single]     [primary/look-up key]
as-name:        [mandatory]  [single]     [ ]
descr:          [mandatory]  [multiple]   [ ]
org:            [optional]   [single]     [inverse key]
member-of:      [optional]   [multiple]   [ ]
import:         [optional]   [multiple]   [ ]
export:         [optional]   [multiple]   [ ]
default:        [optional]   [multiple]   [ ]
remarks:        [optional]   [multiple]   [ ]
admin-c:        [mandatory]  [multiple]   [inverse key]
tech-c:         [mandatory]  [multiple]   [inverse key]
cross-mnt:      [optional]   [multiple]   [inverse key]
cross-nfy:      [optional]   [multiple]   [inverse key]
notify:         [optional]   [multiple]   [inverse key]
mnt-lower:      [optional]   [multiple]   [inverse key]
mnt-routes:     [optional]   [multiple]   [inverse key]
mnt-by:         [mandatory]  [multiple]   [inverse key]
changed:        [mandatory]  [multiple]   [ ]
source:         [mandatory]  [single]     [ ]
```

KEY-CERT

```
key-cert:       [mandatory]  [single]     [primary/look-up key]
method:         [generated]  [single]     [ ]
owner:          [generated]  [multiple]   [ ]
fingerpr:       [generated]  [single]     [ ]
certif:         [mandatory]  [multiple]   [ ]
remarks:        [optional]   [multiple]   [ ]
notify:         [optional]   [multiple]   [inverse key]
mnt-by:         [mandatory]  [multiple]   [inverse key]
changed:        [mandatory]  [multiple]   [ ]
source:         [mandatory]  [single]     [ ]
```

ORGANISATION

```
organisation: [mandatory]    [single]          [primary/look-up key]
org-name:     [mandatory]    [single]          [look-up key]
org-type:     [mandatory]    [single]          [ ]
descr:        [optional]     [multiple]        [ ]
remarks:      [optional]     [multiple]        [ ]
address:      [mandatory]    [multiple]        [ ]
phone:        [optional]     [multiple]        [ ]
fax-no:       [optional]     [multiple]        [ ]
e-mail:       [mandatory]    [multiple]        [look-up key]
abuse-mailbox:[optional]    [multiple]        [lookup key]
org:          [optional]     [multiple]        [inverse key]
admin-c:      [optional]     [multiple]        [inverse key]
tech-c:       [optional]    [multiple]        [inverse key]
ref-nfy:      [optional]    [multiple]        [inverse key]
mnt-ref:      [mandatory]   [multiple]        [inverse key]
notify:       [optional]     [multiple]        [inverse key]
mnt-by:       [mandatory]    [multiple]        [inverse key]
changed:      [mandatory]    [multiple]        []
source:       [mandatory]   [single]          []
```

Appendix 7: Completed Provider Aggregatable (PA) Assignment Request Form

```
 % Provider Aggregatable (PA) Assignment Request Form

#[GENERAL INFORMATION]#
request-type: pa-ipv4
form-version: 1.1
x-ncc-regid:  nl.bluelight

#[ADDRESS SPACE USER]#
%
% Who will use the address space being requested?
organisation-name:      Laika
organisation-location:  Amsterdam, NL
website-if-available:   www.laika-dog.nl

%
% Does the organisation already have address space that
% can meet the needs for this request? Enter "Yes" or "No".
space-available:   No

#[ADDRESSING PLAN]#
number-of-subnets:      6
address-space-returned: 195.20.42.0 - 195.20.42.127 to UpstreamISP by 20071225

%
%        Size
%        in CIDR  Immediate Intermediate Entire Period   Purpose
subnet:   /25           120     120        120       dynamic dial-up Ams'dam (*1)
subnet:   /25             0     120        120       dynamic dial-up Utrecht
subnet:   /26            24      35         50       Amsterdam office LAN (*2)
subnet:   /27             0      12         25       web/mail/ftp servers Utrecht
subnet:   /27            10      12         19       web/mail/ftp servers A'dam
subnet:   /28            14      14         14       training room LAN Amsterdam
totals: /24,/25,/28     168     313        348

%
% Which netname will be used when registering this network in
% the RIPE Database?
netname:  LAIKA-NET

#[EQUIPMENT DESCRIPTION]#
%
% Please describe the equipment that will be used in the
% network. Indicate the function of the equipment and provide
% information regarding the way it uses IP address space.
equipment-name:    Dial-up Server
manufacturer-name: Cyclades
model-number:      PR4000
other-data:        capacity 32 lines each, 2x4 =8 servers

equipment-name:    Hosting Server
manufacturer-name: Dell
model-number:      various models
other-data:        23+19 servers

#[NETWORK DESCRIPTION]#
%
% If your description does not allow the Hostmaster to
% understand the request you may be asked additional
% questions. Please add any additional information that you
% think may facilitate the evaluation of this request below.
```

```
Amsterdam web hosting and dynamic dial-up:
22 domain hosting clients (ftp+mail)
200 http 1.1 websites on 1 server
4 access servers
Utrecht web hosting and dynamic dial-up:
18 domain hosting clients (ftp+mail)
150 http 1.1 websites on 1 server
4 access servers

(*1) 4 x E1 connection
(*2) Office LAN = workstations, router, 2 printers and 1 fileserver



#[NETWORK DIAGRAM]#
%
% Please enter "Yes" or "No" if you have attached a network
% diagram in JPEG or PostScript format to this e-mail
% request.
diagram-attached: No

#[END of REQUEST]#

Thank you,
Jan Jansen
```

What do the **Immediate Requirement**, **Intermediate Requirement**, **Entire Period** headings mean time wise? See below in the table.

Please note that as a result of implementing the ***RIPE Policy Proposal 2009-03***, also known as the ***'Run out Fairly Proposal'*** the Assignment Periods (Planning Periods) will get successively shorter over the course of 2010 and 2011.

	Immediate req.	Intermediate req.	Entire Period
1 Jan 2010	immediate	6 months	12 months
1 Jul 2010	immediate	6 months	9 months
1 Jan 2011	immediate	3 months	6 months
1 Jul 2011	immediate	2 months	3 months